E.E.I. CONVENTION NUMBER

MAY 31 1935

ELECTRICAL WORLD

McGRAW-HILL PUBLISHING COMPANY, INC., NEW YORK CITY. 25 CENTS PER COPY

MAY 25, 1935

Amazing progress in the development of new devices and in the improvement of existing products occurred during the depression. A new kit of tools is now available to the industry.

This number tells about these new things. Editorial and advertising pages show what they are and where they are to be used—a factual exhibit in print.

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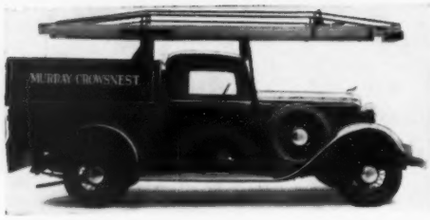

Top illustration shows Murray Demountable Crowsnest ready to go on the job.

Lower illustration shows Crowsnest being lowered to locking position prior to erection.

Illustration at right shows Crowsnest servicing street light, overcoming the hindrance of parked cars.

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MANAGEMENT • ENGINEERING • OPERATION • UTILIZATION
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Technology Paves the Way

IN THE electrical industry the economy of plenty has found its conspicuous practical application. This industry has always believed that the more things people use the more they desire and the cheaper they can be made and sold. It has always sold more and more for less and less. It has put its creative, inventive, engineering and business talents to work with this idea in mind.

This is the history of the industry and is the reason for its prosperity. The lamp, the kilowatt-hour, the refrigerator and the radio are typical illustrations of what has been done and what can be done. The economy of scarcity has been given a trial recently and found wanting. It is abhorrent to the electrical industry.

There has been no hiatus in electrical developments during the depression. The cross-section of product development in this issue is evidence that manufacturers focussed upon the production of new products and the improvement of old products. An astounding volume came to us to augment the many items shown in our pages. In no corresponding period during the history of the industry has there been such great technological progress. New materials, new designs, new manufacturing processes, new products—it seems that engineers and inventors outdid themselves.

MANUFACTURERS wisely took advantage of a lull in business to prepare for a new period of expansion. And what is now commercially available is duplicated by behind-the-scene developments. New things begot new things. The coming months will be prolific with the commercial perfection of more new and improved products. Credit the manufacturers with an outstanding service to the industry.

But these new products do not tell the entire story. Business policies and organizations have been revamped and improved. Market analyses have been made. Rates have been lowered and adjusted. Sales promotion for electrification has been introduced with a powerful effect. The markets are receptive to the products and the industry is organized to sell the products intelligently and profitably in unprecedented volume. The industry is ready to put its economy of plenty theory to the test. It has no doubts about the result if it is given fair play.

It is to the glory of the electrical industry that it never ceases to go forward. It lives the advice of Thomas A. Edison: "Be courageous, go forward." It could not do otherwise if it wished. Electricity affords an inexhaustible storehouse of riches for mankind. It leads a host of research men and inventors into a fascinating labyrinth, and they unearth treasures most unexpectedly and of an infinite variety.

WHATEVER is done today is improved tomorrow. A new use of electricity here leads to others there. A lamp is duplicated by a radio, by a refrigerator, by television and by as yet unseen but equally valuable assets. The genius of electrical men lies in their desire for change, and this comes from their experience with and devotion to the unknown agency they serve. Their enterprise is the glory of the nation.

This depression has been but a breathing period in the business marts. It has permitted the electrical industry to rearm itself. Now that commercial affairs are improving, electrical men will take their new bombs out into industry and blast the *status quo* into oblivion so that people may have new things and use new things.

People will welcome these new things, for they are better and cheaper. But while again busy in the marketplace, the electrical industry would do well to remember that its salvation now, as in the past, lies in the encouragement of the research and invention that produce the products and service it sells. Technology is the foundation of the business and paves the road to prosperity. It is the essence of private enterprise.

TRENDS... The Editors Use a

▸▸Norris Responds to T.V.A. Call

When children get into trouble they cry. So T.V.A. calls upon Senator Norris to aid it in its many difficulties. He is kind hearted and obliging and his T.V.A. bill is the result. On the constitutional plea of navigation improvement, it authorizes $100,000,000 in T.V.A. bonds—twice the present limit—to double its dam building. It makes power a necessary part of the navigation endeavor whereby T.V.A. can build or purchase transmission lines, distribution systems and related generating stations. The idea is to get around the decision of Judge Grubb and to get more money. This bill has passed the Senate without a hearing. The House committee expects to hold hearings before it accepts the Norris bill.

▸▸Guess Right and Give Presents

But Congressmen have other troubles these days. The Patman bonus measure is a red-hot potato for any politician to handle. The banking bill is arousing a chorus of debate, the social insurance bill finds state legislatures adjourned without action except in three instances. The NRA draws fire continuously. The Wheeler-Rayburn bill is a much-discussed proposal. Legislation about everything and for everywhere is on the docket. In the distance is an election. Pity the poor Congressman. How can he master all these subjects in order to vote intelligently. And if he did, would his constituents approve his decision? Moreover, his chief lever for re-election is to be a local Santa Claus with federal funds. They study intricate legislation.

▸▸Debunking the Cold Light Idea

Fireflies have divulged their cold-light secret, but the circumstances give no shudders to tungsten or even sodium vapor. In the G.E. research laboratory it took $25 worth of luminol, sodium hydroxide, potassium permanganate and hydrogen peroxide to concoct a lumen-hour's worth of glow. Sodium vapor does as much for $0.000001 with wires.

▸▸Neglect Costs and Dream

Last year just 2.2 times as much electrical energy was produced from a pound of coal as in 1919. The industry used 1.45 pounds of coal per kilowatt-hour in 1934—it does better every year and the long-sought ideal of 1 pound is now attained and attainable on a large scale. Since 1919 the first cost of an average station has been reduced one-half per unit of capacity. These are the facts that make fuel power inexpensive and water power expensive. But nobody tells a Congressman these things. In fact, many industrial and utility executives do not know them. If they did there would be many rebuilt and new fuel-burning stations going into operation these days. It takes time for economic facts to prevail. But they always do.

▸▸$100,000,000 for Rural

Morris L. Cooke will direct the federal rural electrification program. It involves the expenditure of $100,000,000. No details are available as to how and where the money will be spent. It is certain to stimulate a great deal of development in construction and equipment. These will be real contributions that will be used. Utilities and manufacturers are now busier than ever on rural electrification. This also will result in economic and technological progress. Over-all economics may be against widespread rural electrification. We believe it is. But the present intense activity will prove the case. It will show where it can and cannot be done. Above all, it will bring real progress in engineering, construction, design and products. We learn by experience and we develop by trying to do things.

▸▸R.C.A. to Spend $1,000,000

A research project of private enterprise to develop television. Not a Washington alphabetical spending project. Business, not government, senses commercial opportunities and puts money and man-power into research developments. The Radio Corporation sees a future in television, believes there is a commercial opportunity in developing the art and takes a business bet in an endeavor to bring television to perfection. This is a typical courageous step in the right direction that has made the electrical industry successful.

▸▸Threat to Utilities in Banking Bill

The pending banking legislation in Title II gives the President complete control of banking and credit. It is proper for an Administration to have control of currency, but when political control of credit is made possible there is no limit to the disaster that may follow. Suppose the antipathy of the Administration to big business is applied to the credit of a business. This would be the quick way to destroy any industry. Suppose the credit of the utilities is jeopardized by an antagonistic Administration acting through its con-

Spotlight on Current Happenings and Developments of the Fortnight

trol of the banking system. There is dynamite in Title II of the proposed banking bill. It is an unsound economic and legislative proposal. Think of a Long or Coughlin in the White House with unlimited control of banking and credit. This bill strikes at the foundations of the principles upon which this country has been established. It should be defeated.

▸▸$161,000,000 in Refunding

Utilities have a favorable bond market. They have already refunded $161,000,000 this year. Bonds have gone up 60 per cent in six months. The reasons are obvious. Idle money earns no interest and there is plenty of it. High-grade bonds are in limited supply and in great demand. Fear of inflation induces investment. Utility earnings are stable. There is no lack of ability to refund or to sell bonds. But equity securities are essential to financial health. These are not in demand. The reason is the Washington political threat. Remove this and money for industry expansion can be had by selling securities to maintain a balanced financial structure.

▸▸Night Work for War Production

A reader writes us that the absurd conclusion of the Federal Power Commission that war would bring a power shortage becomes more absurd when further analyzed. For example, he suggests that war production might well be done at night. This would enable existing stations to double their output with ease and would reduce power production costs enormously to all users. Of course. But why wait for war to defeat low capacity factors. Much may be done today with off-peak inducement rates, with the developments of new industries and with thought given to staggering hours of customer use. Here is an enormous waste that needs attention.

▸▸Santa Claus Goes to Maine

The well-publicized Passamaquoddy Bay project is sold. Secretary Ickes has approved a $10,000,000 appropriation for this tidal power project and promises another $26,284,000 needed to develop 166,670 kva. And "work can start in five days." Remarkable! With competent reports showing the economic fallacy of this development, with more power now in Maine than can be used, with the vaguest possible agreement upon the cost of the development and with no possibility for using the power when produced, it is apparent that Maine votes are in the background for this expenditure. But King Canute gained no votes by his tidal project; he was called crazy. Perhaps history will repeat itself.

▸▸Swap Ideas and Information

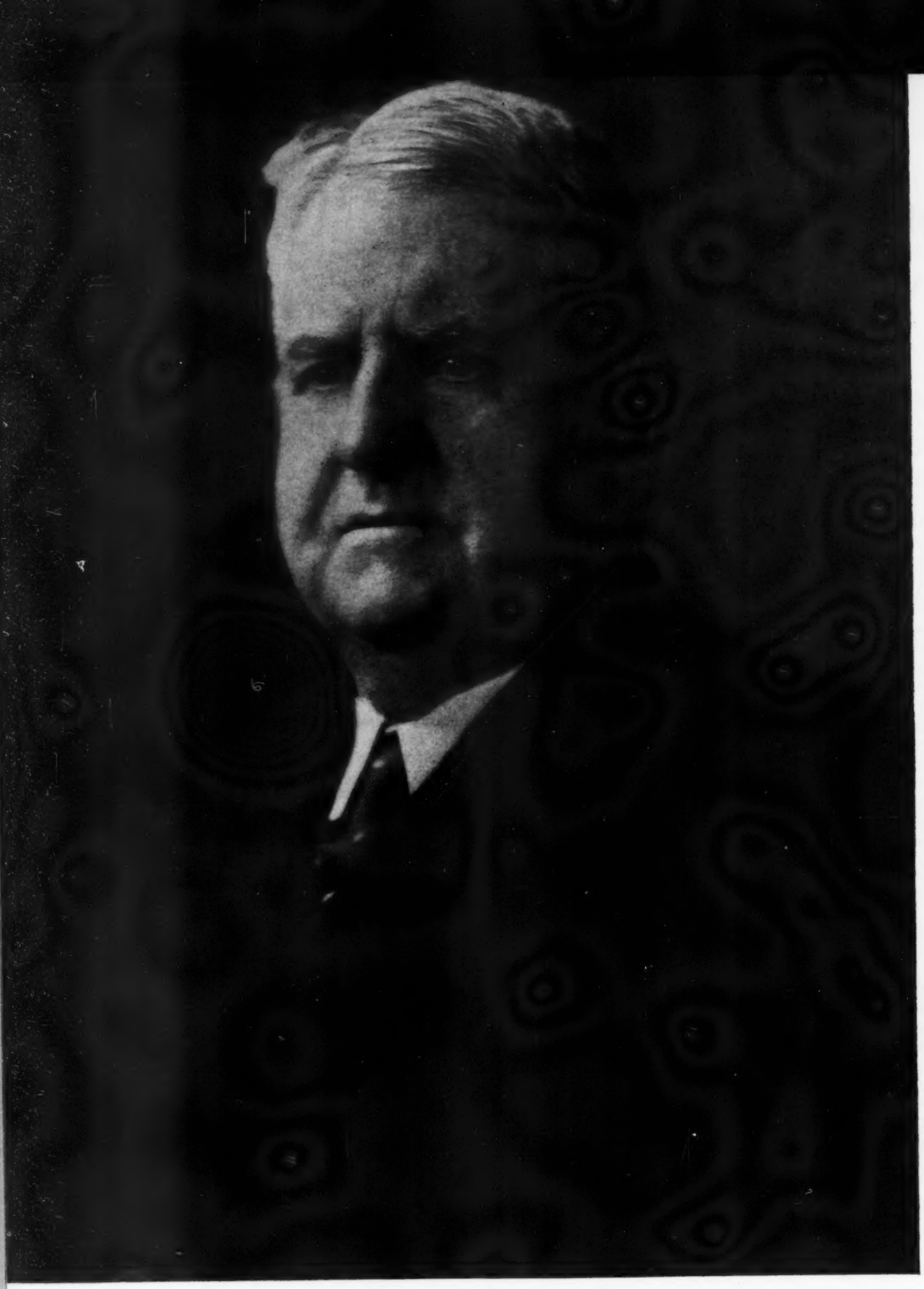
A revival of meetings in the electrical industry is a sign of renewed vitality. The Edison Institute meeting is duplicated by many other national and regional meetings this year. Nothing is more vital than these occasions for the exchange of ideas and information, with their rich, human reactions. A pat on the back stimulates a man to go forward. A new idea taken home and applied may reduce costs or increase business. There are many new things and new ideas these days. These meetings help to get them into action. More than this, they build the unity and improve the morale of the industry. They are essential to health and progress.

▸▸Go Thou and Do Likewise

In 1934 the Georgia Power Company sold $2,579,142 of appliances—$22.50 per customer. This value exceeded the quota by 158 per cent. These sales added 18,000,000 kw.-hr. in new business. In 1933 merchandise sales per customer were only about $9. This is a sample of what can be done by putting money and man-power into sales. Above all, it shows what an enthusiastic and hard-working utility organization can do when it makes up its mind to go forward and overcome handicaps. We nominate Georgia Power as a charter member of the hustling utilities.

▸▸Why Not 10 Cycles in California?

Professor Lincoln wrote a letter which was published in our last issue advocating the use of 10 cycles for the transmission of Boulder power. He makes a good case. He is sound in his economics for the distances and the magnitudes. A busbar for the Pacific slope at 10 cycles would be of great advantage now and in the future. But we are seldom logical or sound on these great engineering projects. Boulder Dam can be challenged. It is an economic fallacy. Long-distance transmission of power with a busbar itself may be uneconomical in California. All enterprises probably would not agree on a common frequency and would act as individuals. But past mistakes do not justify future ones. The suggestion that future projects be studied with his comments in mind is practical and constructive.



THOMAS N. McCARTER

PRESIDENT EDISON ELECTRIC INSTITUTE

Cleared for Marketing Action

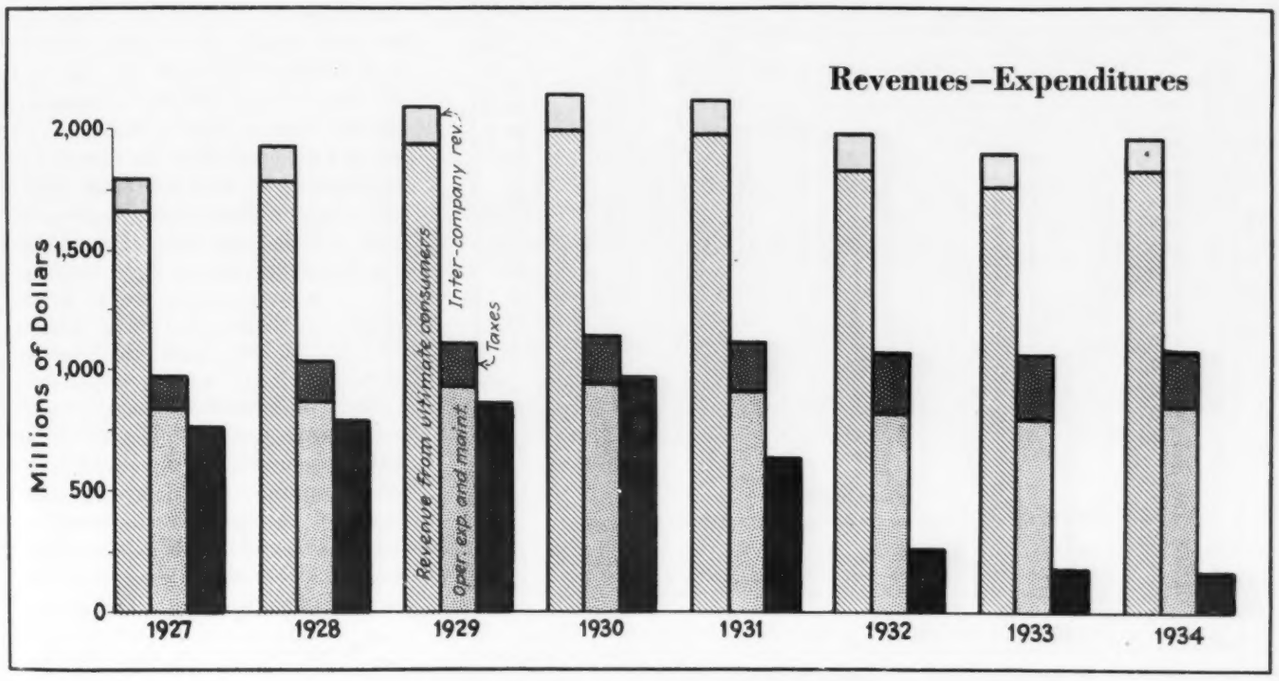
Business Better Now and Outlook Promising — All Branches Organized for Expansion — Utilities, Manufacturers, Wholesalers, Contractors and Retailers Ready to Co-operate in Sales — Will Go Forward Despite Political Threats

BUSINESS conditions in the electrical industry are encouraging. Data on the operations of all branches show a fair volume of business and an increase in negotiations for business. Majority opinion indicates a still larger volume of business and increased net earnings in the coming months.

These conditions and these sentiments prevail despite uncertainty and opposing schools of thought in national policies in government, finance and legislation. Opinions differ as to where we are headed in this country, but on the actual firing line of electrical sales the business figures are quite encouraging.

Economic and social conditions favor an increase in electrical business. Electrification is in popular favor. Electrical products and electric service are considered necessary to advance both economic and social standards in this country. Government spending and action are directed toward increased electrification. Industrial revival and the modernization of industrial plants rest upon electrification. Home and farm electrical markets are booming. The present improvement in the economic status of all markets is valid and will be supplemented by augmented federal spending. The fear of inflation and low values for interest on money influence spending for physical property and equipment. Examples are now available of action in all markets to show that business may be had and to show how to get it. Aside from proposals for destructive utility legislation now in Congress, the promise of better business for the electrical industry is supported by tangible and intangible factors that are conclusive.

The industry is going into action and is ready for an expansion program. Readjustments have been made in policy, in organization, in finance and in business practices to meet new conditions. All enterprises have been hardened and made efficient by the blows of the depression. The personnel of the industry has recovered its spirit and is stimulated by the possibilities for expansion. Even the utilities are going forward and intend to go forward despite their persecution. As so well put by Thomas N. McCar-



Central-station operations, 1927-1934

Revenue has fluctuated between fairly narrow limits; likewise operating and maintenance costs, but new construction has almost come to a standstill. Taxes alone show a steady increase.

ter recently: "This industry is going forward. This very year, in the face of attacks, the utilities have gone forward." This is the spirit and the attitude found in all branches of the industry.

Utility skies clearing

Utility prosperity is essential to the progress of the industry. This branch has been the focus of political attack, rate reductions, stringent regulation and discriminatory taxation. By reason of some abuses by a few of its members, it has been singled out as a target for attack by those in high places. This reaches its peak in the proposed Wheeler-Rayburn bill, which occupies the attention of executives as well as the limelight in the newspapers. The overwhelming and convincing evidence of the destructive character of this bill presented at the hearings promises to get a drastic modification.

In the meantime the utility business itself has improved. Load values are back to 1929 levels; in 1934 they were 7 per cent over 1933, and continue to increase. Record-breaking progress has been made in domestic sales. Industrial business is now improving. The gross earnings are increasing. Net earnings as yet are only fair because of increased costs, rate reductions and higher taxes, but they promise to improve in the coming months.

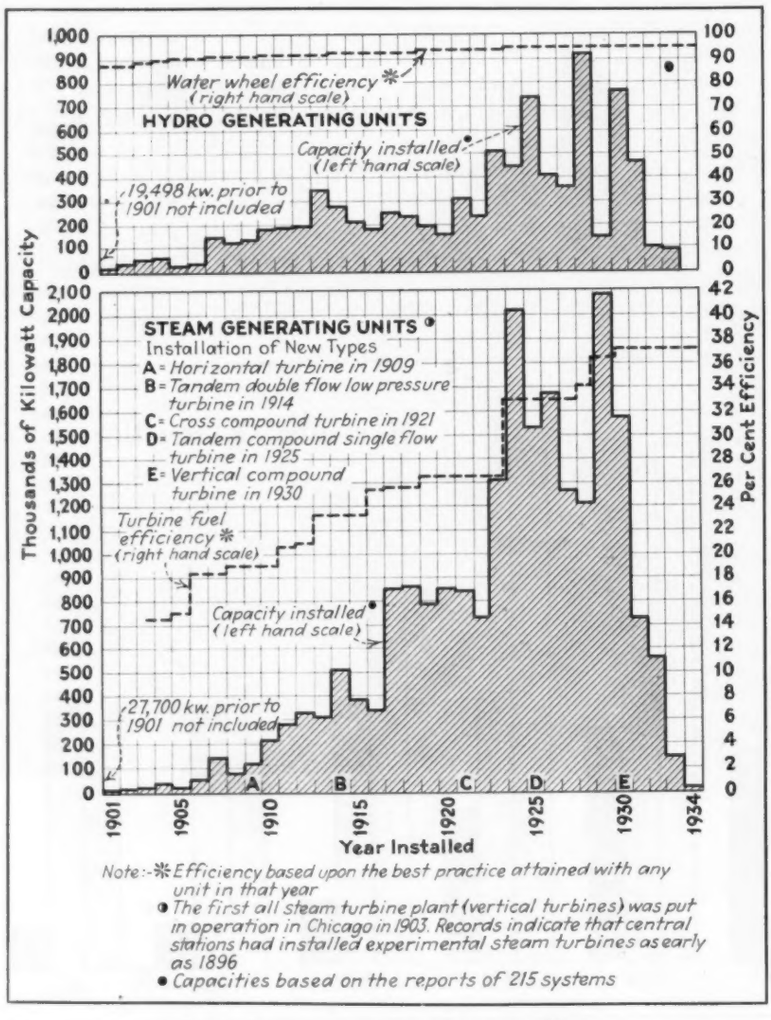
These data indicate that a continued upturn in business will find the utilities active in buying and selling in the near future, especially if there is no punitive legislation. Utility bonds have increased about 60 per cent in market value during the past ten months and this fact is evidence of two favorable conditions. One is that the demand for high-grade bonds exceeds the supply and the other is that present earnings sustain utility bond values. Undoubtedly utilities can sell refunding bonds and can sell new bonds for expansion as the necessity arises. Preferred-stock values have also increased considerably and common stocks have an upward trend that will continue if political threats cease and if earnings continue to improve.

Refunding operations by several utilities this year attest to their good investment position. These amounted to $161,000,000 in four months.

Most significant in the utility situation is an improvement in morale, in organization and in the adoption of new and aggressive policies. Utilities have become salesminded and the slogan "Let's sell our way out" is becoming an applied business policy. Intensive drives backed by man-power and money are being made in all markets and business is being obtained at an accelerated rate. Agitation for rate reductions has decreased, new regulatory legislation has been passed, local public relations have improved. Organizations and policies in holding and operating utilities have been changed to meet the new conditions.

Municipal ownership competition and federal competition are on the decrease and are exaggerated in their present effect upon the business of the industry. For example, the P.W.A. loans proved to be a dud. There were 377 applications. One in every six was subsequently withdrawn. One in twelve was rescinded. Rejections account for 44. The actual electrical projects completed or under construction number 45, with an aggregate allotment of $25,000,000. More than half of these call for additions to existing municipal plants or distribution systems. Only seventeen call specifically for new electric plants, and these have an allotment total of $1,212,600—a one-hundredth of 1 per cent part of the capital investment of private utilities. Municipal P.W.A. projects do not loom large in the electrical picture.

There is little fear that the public will permit private enterprise in the utility business to be destroyed by political action. The light and power men and women have done and are doing too good a job to succumb to the attacks of demagogues or to advocates of government ownership.

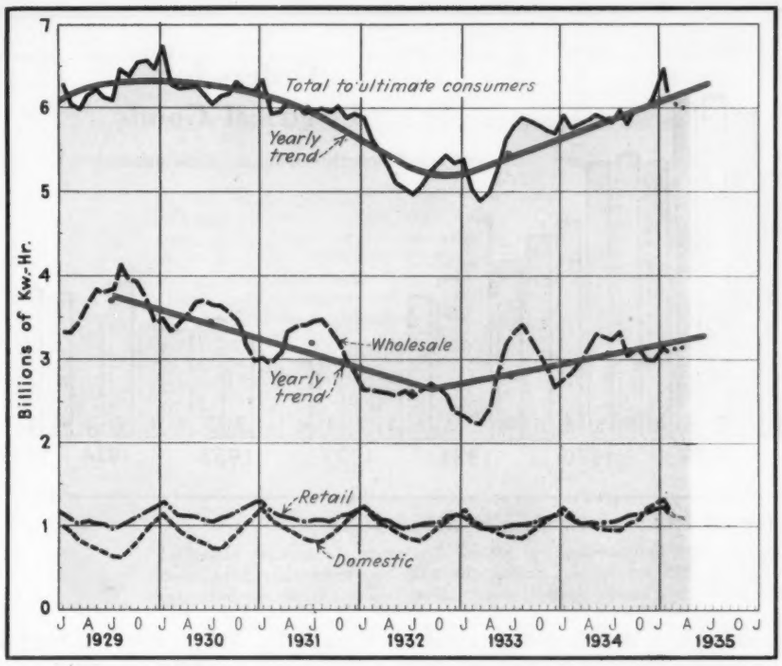

Water wheel efficiency *
(right hand scale)
HYDRO GENERATING UNITS
Capacity installed •
(left hand scale)
19,498 kw. prior to 1901 not included
STEAM GENERATING UNITS •
Installation of New Types
A = Horizontal turbine in 1909
B = Tandem double flow low pressure turbine in 1914
C = Cross compound turbine in 1921
D = Tandem compound single flow turbine in 1925
E = Vertical compound turbine in 1930
Turbine fuel efficiency *
(right hand scale)
Capacity installed •
(left hand scale)
27,700 kw. prior to 1901 not included
Thousands of Kilowatt Capacity
Per Cent Efficiency
Year Installed
Note:-* Efficiency based upon the best practice attained with any unit in that year
• The first all steam turbine plant (vertical turbines) was put in operation in Chicago in 1903. Records indicate that central stations had installed experimental steam turbines as early as 1896
• Capacities based on the reports of 215 systems

When present units were installed

Year of installation of hydro and steam units that were in operation in 1934, and maximum turbine efficiency in each year. Chart accounts for 30,702,964 kw., of which 59 per cent is at least ten years old, 15 per cent twenty or more.

Manufacturers go into black

In 1929 electrical manufacturers produced products with a value of $2,300,915,572; in 1933 this figure



Monthly sales of energy to ultimate consumers

Trend of sales to wholesale customers is upward. Domestic use is greater than ever before; the refrigerator and other appliance loads are filling the summer "valley." Retail commercial sales have nearly recovered ground lost in 1932. (Data from E.E.I.)

was $549,983,599. Is it any wonder that 1933 balance sheets showed red instead of black figures for nearly all manufacturers? In 1934, however, the turn came and the value of products went to about $700,000,000, and 1934 expectations are for at least $830,000,000. Business volume is coming back.

But these figures do not tell the entire story. The NIRA experience, the cost changes in labor, taxes and raw materials, the trade association developments, the wide fluctuations in volume of products sold to each market, and the research and development program have affected manufacturing operations. The manufacturers have been busy if not prosperous. They have gone through a trying period and now stand as a vigorous, healthy and essential group to co-operate in expansion of the industry.

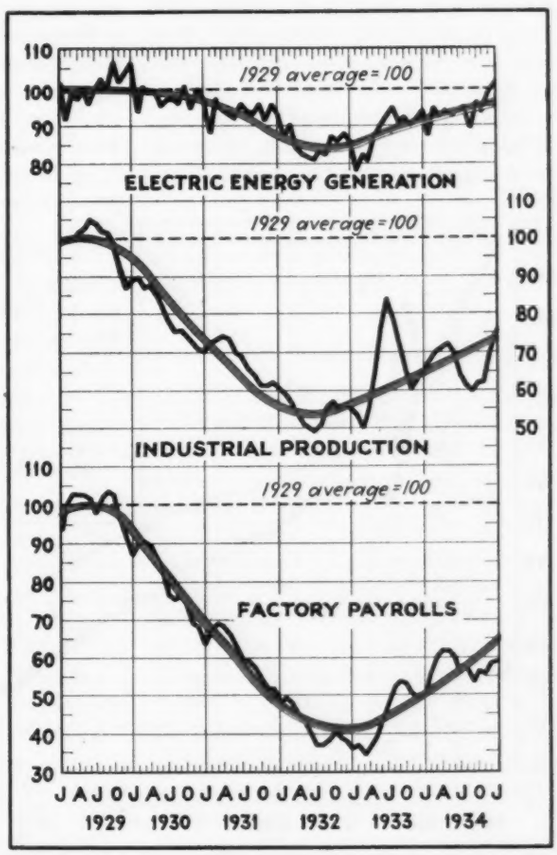
Manufacturers emerged from the code experience wiser and better off on the whole. The negotiations took executive time and money and made necessary a thorough study and analysis of manufacturing. They brought together all electrical manufacturers and thus advanced the industry through intimate personal contacts and a better understanding of each other's problems. This was the greatest single benefit of the NRA.

But a code was obtained that was almost a model and amendments have since been approved. Organization for code operation through N.E.M.A. was perfected. Code principles and practices were put to work. Labor troubles were met and overcome on an individual and a co-operative basis. Authorities in Washington were met in a spirit of co-operation.

Experience to date under the code does not permit of any conclusions of a specific character as to its business advantages. It brings unity, it helps develop statistics and cost accounting, it brings group executives together into a business forum, it helps to stabilize trade practices. The direct assets are difficult to measure for individual manufacturers, and therefore expense increases are vivid in some minds. The consensus of opinion is that electrical manufacturers do get values from the code and have operated their code through N.E.M.A. with great success and comparatively little difficulty, considering the conditions.

Sales increase in all markets

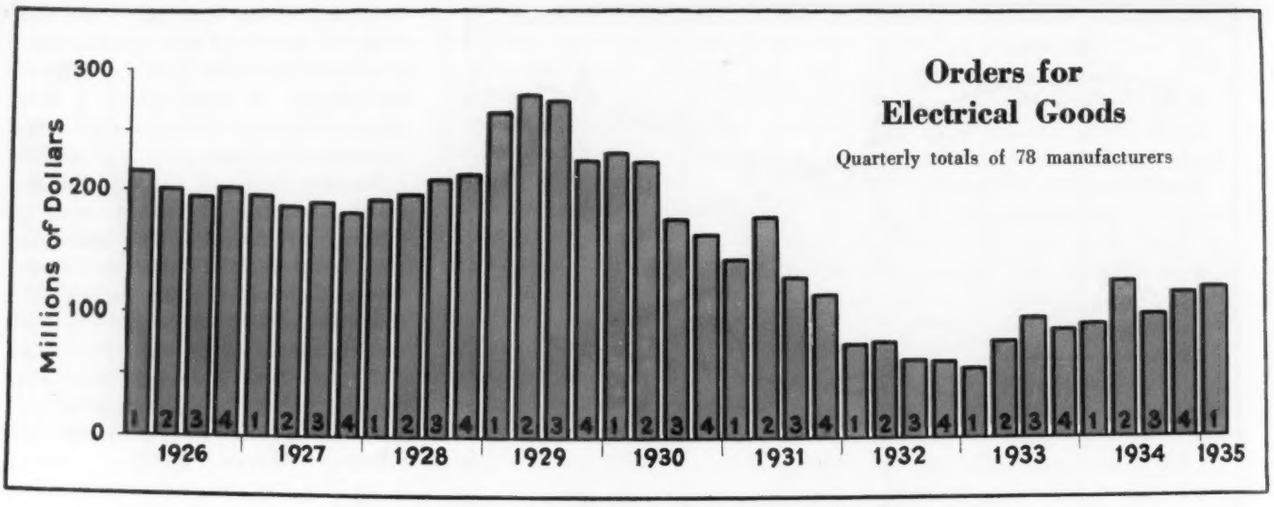
In the realm of sales the manufacturing situation has been spotty. Heavy power and industrial equipment has been and still is at a low ebb. Steel mill modernization, the return of utility loads and general industrial activity now promise an improvement in this situation. Distribution equipment, such as meters and transformers, has gained in volume. Transmission line equipment and underground cables and devices have been slow to date. Appliance sales have set new records and continue to increase. Es-


1929 average = 100
ELECTRIC ENERGY GENERATION
1929 average = 100
INDUSTRIAL PRODUCTION
1929 average = 100
FACTORY PAYROLLS
J A J O J A J O J A J O J A J O J A J O J A J O J A J O J
1929
1930
1931
1932
1933
1934

Electric energy output, industrial production, payrolls

Referred to 1929 average

Energy generation is nearer the 1929 level than production or payrolls. All are rising. As the latter two approach previous high levels energy output will considerably exceed its previous maximum. Production is here used as an indicator of demand, payrolls as evidence of spending power. (Data from F.P.C. Interim Report.)



First quarter of 1935 more than doubled 1933

Flagging of new construction severely curtailed the demand for durable goods. Orders for electrical manufactures fell to one-fifth of their 1929 maximum; during the past two years they have been increasing. Returns, as reported by U. S. Census Bureau, cover about two-thirds of the industry.

pecial emphasis is being placed on ranges, water heaters, refrigerators and air-conditioning equipment as load builders. The Better-Light campaign has brought good results in lighting equipment sales. Electric heating devices, especially in small applications, have had a steady sale in industry. Electric transportation has been quite active and navy electrical business has been good. Building construction has been at a low ebb and wiring supplies and devices have been slow. The move to home modernization and slum clearance promises to increase this business.

As shown in this issue, an amazing development has occurred in electrical products in the past two years. Time was available to do this and the results are evident. These new and improved products open deeper and wider markets and produce a large market for the replacement of obsolete or uneconomical equipment.

The price situation? This is a mixed picture also. In general, price levels are fair for the volume of business now done. Cut-throat and destructive price-cutting has been absent. If business increases in volume there will be price reductions in many lines.

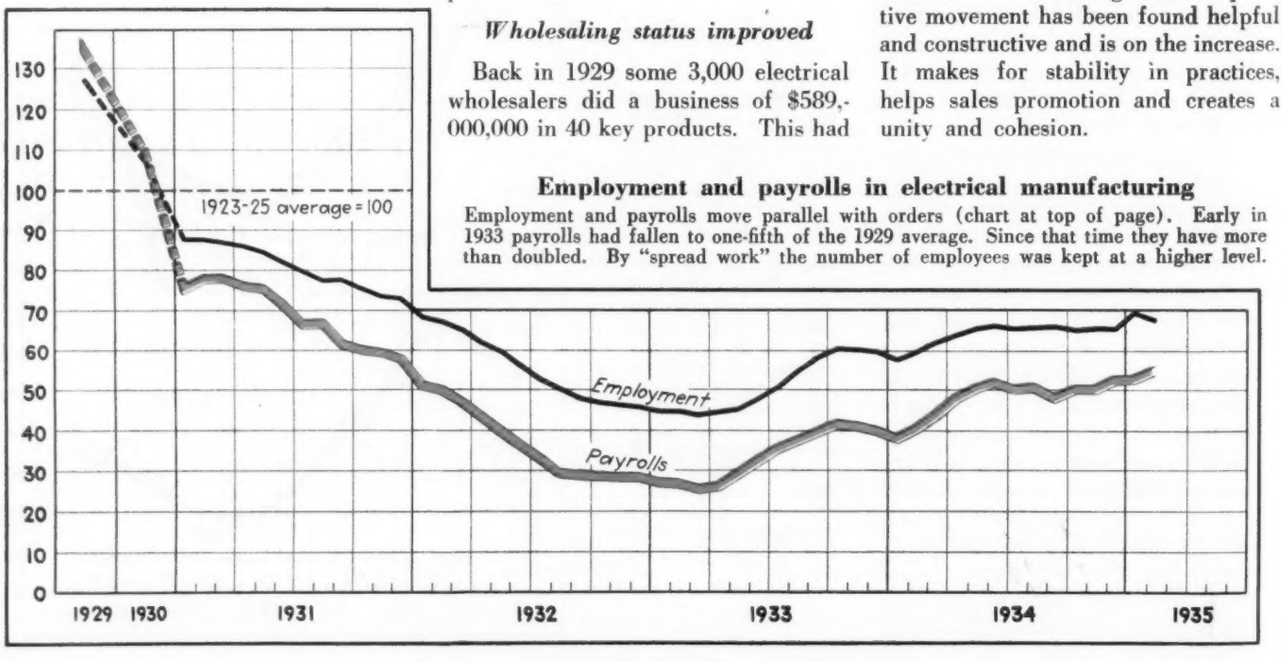
Electrical manufacturers are organized and are embarking upon aggressive sales campaigns. They expect to get more business in every market. They have new and improved products. They have money to spend and manpower to sell.

Wholesaling status improved

Back in 1929 some 3,000 electrical wholesalers did a business of $589,000,000 in 40 key products. This had decreased to $254,000,000 in 1932 and only went up to $264,000,000 in 1933. In 1934 the volume increased to $343,000,000 and expectations this year are for a 30 to 40 per cent increase. So much for the basic figures.

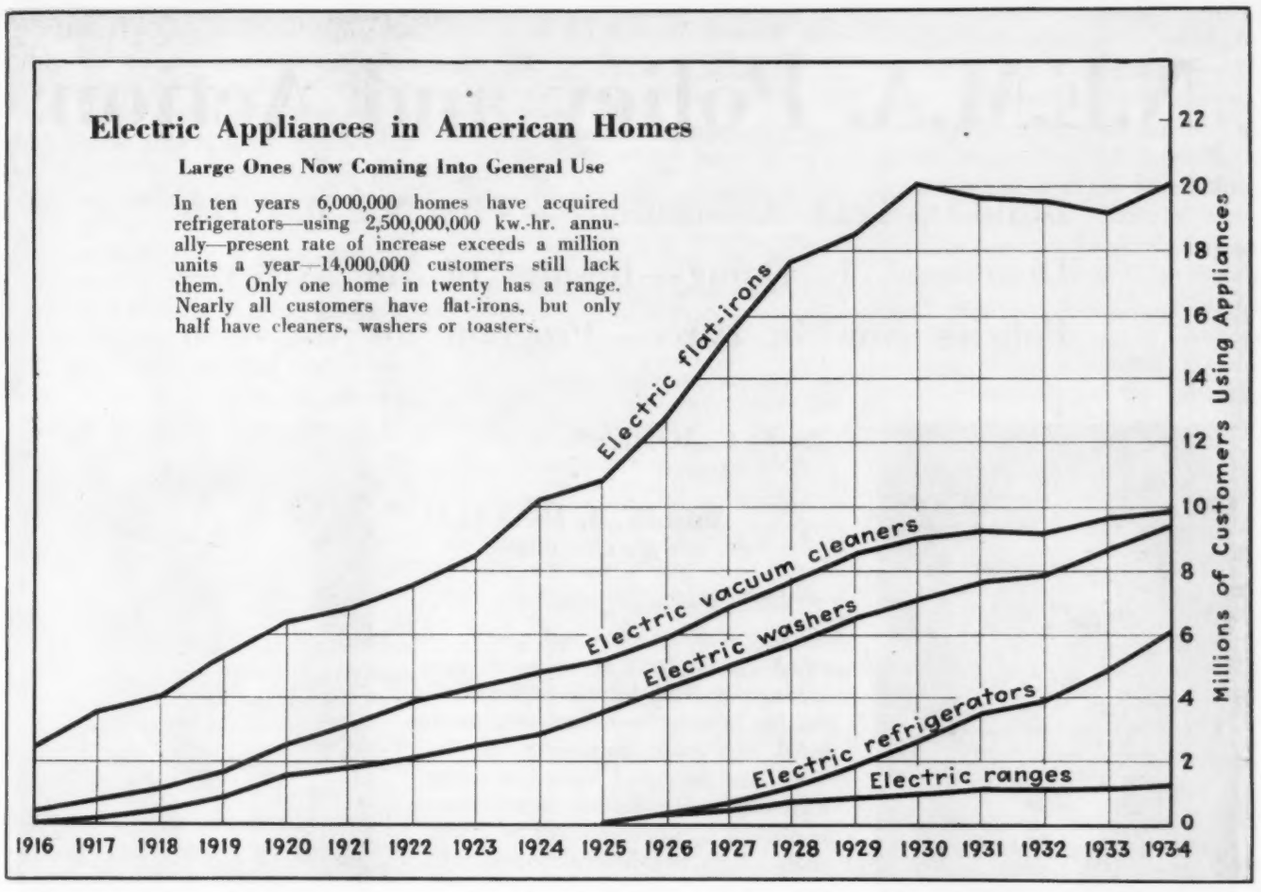
Mortality among the wholesalers has been negligible and some 123 new units have entered the business recently. The 66 per cent of independents and 33 per cent of chain wholesalers have also remained unchanged. No basic change has come about in organizations or functional operations except one. This has been the movement to organize local groups into trading areas for co-operative work.

There are now about 24 local wholesaling organizations that are active and effective. This trading area co-operative movement has been found helpful and constructive and is on the increase. It makes for stability in practices, helps sales promotion and creates a unity and cohesion.



Employment and payrolls in electrical manufacturing

Employment and payrolls move parallel with orders (chart at top of page). Early in 1933 payrolls had fallen to one-fifth of the 1929 average. Since that time they have more than doubled. By "spread work" the number of employees was kept at a higher level.


Electric Appliances in American Homes
Large Ones Now Coming Into General Use
In ten years 6,000,000 homes have acquired refrigerators—using 2,500,000,000 kw.-hr. annually—present rate of increase exceeds a million units a year—14,000,000 customers still lack them. Only one home in twenty has a range. Nearly all customers have flat-irons, but only half have cleaners, washers or toasters.
Electric flat-irons
Electric vacuum cleaners
Electric washers
Electric refrigerators
Electric ranges
Millions of Customers Using Appliances
0
2
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1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934

The code experience of the wholesalers was helpful chiefly in indirect fashion. It brought them together, was educational, made for friendship and unity and gave other intangible benefits, but it had little, if any, direct business effect. The N.E.M.A. code aided greatly in stabilizing the industry, however, especially where filed prices were used. It made discount dates and values more effective and put the wholesaler on a fairer competitive basis with the direct selling manufacturer.

At the present time the wholesalers are encouraged by business conditions and business policies. Their margins from manufacturers have been increased on the whole, their volume of business has increased and business practices are better. Appliance sales are up, wiring supplies sales are better and a revival of building construction is anticipated.

In morale, in organization and in business practices the wholesalers are ready to go forward on their own initiative and are able and ready to cooperate in industry sales.

Survival for contractors

What has happened to electrical contractors? Back in 1929 there were about 35,000 of these; this year there are some 17,000 in business. The contracting business in 1929 was approximately $600,000,000 and it shrunk to $60,000,000 in 1933. Last year it was about $120,000,000 and it is better this year.

The turn has come in electrical contracting for those who were sound enough to survive the depression. Modernization work, appliance sales, some P.W.A. and government work—these have brought some improvement. Contractors look for increased business in home construction and commercial buildings. They are worried about costs now and the threat of the 30-hour week, which they estimate would increase electrical construction costs 50 per cent.

In April, 1934, the contractors' code went into operation. It has aided them greatly, chiefly by stopping chiseling and bid peddling. With an upturn in business in prospect those who survived the depression expect better conditions in the contracting business.

Undoubtedly the average contractor who survived is a better business man than the average contractor who existed before the depression. He learned how to do business, he learned how to do creative selling to get business, he learned about good and bad business practices. Those who survive must have been intelligent and creative business men. They must have made money under trying conditions.

With this type of contractor and with the unity they now have, the other branches of the industry can count upon intelligent and effective co-operation in industry sales plans. More than this, the contractors will create and stimulate business on their own initiative as never before. They know how.

Conclusion

This brief survey shows that the industry is ready and willing to go forward and is organized to improve upon its present business position. The greatest threat to progress is the proposed Wheeler-Rayburn bill, and if, as is anticipated, this is modified greatly there is every reason to believe that a great stride will be made toward industry prosperity in the coming months. The history of the industry under the blows of the depression shows a remarkable vitality and ability to adjust itself to new conditions. It can be counted upon to do its utmost to realize upon the present opportunities for sales of services and products.

N.E.M.A. Policy and Action

Build Up Trade Associations—What N.E.M.A. Has Done and Is Doing—Results of the NIRA—Policies Now in Force—Program for the Year

By F. C. JONES*
President

and W. J. DONALD
Managing Director

National Electrical Manufacturers Ass'n

AT FIRST the existence of NIRA resulted in a quick rehabilitation of trade associations, not only in terms of membership and income, but also in terms of influence, and let it be said that the great majority of trade associations, especially those formerly in existence, did a constructive, intelligent job of education of members of the industry, and withal in a rather patriotic spirit.

With the establishment of code authorities, in the election or appointment of which trade associations may or may not have had a part, according to the particular conditions, attention was focused on the code authorities as the attention of a child is drawn to a new toy.

As the costs of code administration became evident, the demand for power to assess all members of an industry appeared, and NRA obliged with a plan for mandatory code assessments and for approval of code authority budgets.

The upshot has been that in many industries the trade association and its activities have fallen to low estate, its budget has shrunken and reliance on its services has more or less evaporated. In the last few months the conviction that NRA was the healer of all ills has in many industries been translated into doubt, sometimes into despair, and here and there into active opposition. Hope today rests on speculation as to what an extended NIRA will contain and how the courts will interpret it.

It is our belief that without a strong trade association American industries will fail to do a good job of code administration and, moreover, would find themselves in a very weakened and probably chaotic condition in case NIRA should not be extended, and that a resultant period of disorder, more or less extended, might follow.

Speaks on national legislation

In the National Electrical Manufacturers Association we have had a dramatic demonstration of how true it is that a well-organized trade association has contributed substantially to code education and to code enforcement. With one or two exceptions the degree of compliance has been very much higher in those branches of the electrical manufacturing industry which were organized as sections of N.E.M.A. for years before the advent of NIRA. The contrast between the recently organized sections and those formerly organized is marked—so marked indeed that it has been hard to explain how it is that there can be so much talk about non-compliance in one branch of the industry and so little in another.

At the present time it is desirable that organized industry shall make its influence heard and felt on national legislation. This is no time to be docile or to take a defeatist attitude on the assumption that proposed legislation, either national, state or local, will be passed in the form in which it is first proposed, as many industries are doing, and it is no time either to assume that national organizations like the Chamber of Commerce of the United States, National Association of Manufacturers, or others, can do the whole job of speaking for organized industry. Such legislation as the 30-hour week bill and the proposed national labor relations act represent a serious threat to industry if they are passed. Proposed social security legislation needs the light of the intelligence of all groups and industry should not be backward in expressing its views as to what is unsound or as to what is sound. The time has come when industry should make itself heard in no uncertain terms as to what is good and what is bad from an industry viewpoint, and also from a public standpoint in the proposed legislation regarding NIRA before it takes final shape. The time has come when

*President of the Okonite Company.

the federal government is affecting and probably will continue to affect industry more vitally than ever in the past, much more vitally, and business men will not be able to ignore federal legislation or be content to have their views expressed by delegating the job entirely to other organizations. If industry finds itself in a straitjacket in the course of the next few years it will have itself to blame if it lets the matter go by default. In this expression of industries' viewpoint the trade association is one of the most logical, most important and absolutely essential elements.

In doing everything practicable to preserve and strengthen the National Electrical Manufacturers Association, it has seemed desirable to concentrate on a few important measures. These have been defined, clarified and simply stated so that all concerned, members and others, can understand them clearly:

1. Establishing a program of activities for the current fiscal year and making it known adequately to all members of the industry.
2. Establishing policies for managing N.E.M.A. efficiently and economically.
3. Adjusting the N.E.M.A. organization to the extent necessary to carry out the policies required to attain the objectives.
4. Improving procedures in order to make it easy for the organization and the personnel to execute the policies in order to attain the objectives.

In the first place, it is essential for the success of any trade association to have a clear-cut understanding of its *objectives*. For 1934-35 these have been stated in terms of the needs of the electrical manufacturing industry as follows:

1. Increased profits or elimination of losses.
2. Increased employment and purchasing power.
3. Increased sales of electrical products.
4. Decreased unit costs of production, sales and management.

Last autumn it seemed essential to formulate a definite program for N.E.M.A. and this was published late in 1934 as, "What N.E.M.A. will do in 1934-35." This contains a complete statement of the N.E.M.A. program under its larger headings, divided into its subsidiary items of service. This program includes:

1. Uniform legislation and ordinance work.
2. Trade extension and business development program.
3. Administration of the Code of Fair Competition for the industry.
4. Statistical activities, including those on closed business transactions.
5. Continuation of the uniform accounting and costing service.
6. Recurring tariff and customs activities.
7. Product standardization work.
8. An active participation in the biennial revision of the National Electrical Code.
9. Protection of the industry against unreasonable and economic demands for contributions and for expenditures in connection with shows and exhibits.
10. Taking an active and definite position on all important national legislation affecting the industry.
11. A constructive job of education in regard to what constitutes sound policies for members of the electrical manufacturing industry.

The outstanding developments of the last year in regard to this program of work have been:

1. Improvement and intensification of previous and existing activities before the addition of new activities.
2. Entry of N.E.M.A. into the field of taking a position in regard to national legislation.
3. Taking positive steps to increase the sales volume of the industry through a business development program which will be adopted in the near future.

A trade promotion plan

There has been on foot for some time an effort to discover and put into effect new services to members of the industry heretofore unused and relatively overlooked. The most important of these is a plan of business development on trade promotion, which received the consideration of the membership of the industry at the spring meeting at Hot Springs, Va., this week. It reflects the desire and indeed the determination of the industry to have the full share of the increased volume of American business to which it is entitled in the coming decade. This determination is born of the conviction that the American standard of living should be an electrical standard. Indeed, there is a strong belief that as the durable goods industries recover from the low state to which they have fallen during the depression the electrical manufacturing industry may contribute exceptionally to that recovery and N.E.M.A. intends to afford every opportunity for the industry to have not only its former share but also the increased share to which it seems economically and technologically entitled.

In the last few years the concept of "business policy" has been recognized by a great majority of business men, and it is becoming generally understood that good business requires the establishment of sound policies by the individual company and the following of those policies without discrimination. NRA, if it has done nothing else, has accomplished a great deal in dramatizing this concept of business policy.

In the course of developing supplementary Codes of Fair Competition all of the sections of N.E.M.A. have had the opportunity—in fact, have been faced with the necessity—of consider-

Need Fair Treatment Only

E. K. WOODWORTH
Chairman

We call attention to the fact that the utilities have continued to render efficiently the various services for which they were established and with electric output running at or near peak figures. The essential nature of the service rendered, the marked efficiency which attends management and the certainty of continued growth bespeak a favorable field for the investment of savings. It is believed all that is needed to assure a renewal of the upward trend which marked the industry for so many years prior to 1931 is confidence that honest investments will receive wise and fair treatment at the hands of the elective representatives of the people whose savings have made possible the extraordinary development of an industry born only 55 years ago.—Report of Public Utilities Committee, National Association of Mutual Savings Banks, May 8, 1935.

ing business policies as they never considered them before. The educational values which have accrued to the individual business man from these discussions have been enormous. With scrupulous care to observe the law in every particular, partly from desire and partly because it is a large industry, the hopes are that these discussions of sound business policies will result in economies of doing business that will accrue not only to the industry but also to the customers of the industry.

Such an extensive program requires sound policies for its execution, and during the last year careful attention has been given to the management policies of the N.E.M.A. organization. We take it for granted that an organization with a $600,000 budget, which is comparatively small for the volume of work to be done, has the same reason for clearly stated and written management policies as any private business organization. The policies of N.E.M.A. which have been formulated to date fall into the class of dues and assessment policies; membership maintenance and promotion policies; public relations and publicity relations; personnel policies; purchasing policies and financial policies.

Of these policies for the management of N.E.M.A., some of the most important are as follows:

1. N.E.M.A. has adopted a cost of service basis for determining charges to and the rates of dues for different product groups or classifications organized in N.E.M.A. We have found that this policy has brought very satisfactory results compared with previous years, despite some defects. The policy is, of course, incorporated in the by-laws as the basis for determination of dues.
2. Minimum rates of dues have been reduced from $120 a year to $30 a year.
3. It has become the policy to seek and welcome all members of the industry as members of N.E.M.A.
4. The News Letter N.E.M.A. is providing promptly to all members of the industry and to the trade and business reading public to the extent that it is interested.
5. A set of purchasing policies for the organization has been prepared and adopted in the interests of economy and efficiency.
6. Policies for the improvement, promotion, training, compensation and release of employed personnel have been approved and put into effect.
7. Policies having to do with other aspects of the management of N.E.M.A. are in process of formulation or in process of being written, even though they are understood and already in effect, and by the end of this calendar year a complete statement of management policies for N.E.M.A. will have been adopted in written form.

A major consideration in building up a trade association is so to establish the organization structure and accommodate the personnel to the structure as to attain the objectives and carry out the policies by which they are to be attained economically and efficiently. The major changes which have recently occurred in N.E.M.A. are as follows:

1. An officers' committee consisting of all of the officers of the association is associated actively with the president in analyzing problems and laying plans for consideration by the board of governors and for consultation with the managing director. The existence of this committee insures a balanced and constructive consideration of the major issues and affords an opportunity for consideration of all of the facts before final action is taken, more facts than any board of governors, consisting of important business executives, could consider individually or in a large meeting.
2. New sections, groups and sub-groups of N.E.M.A. are being organized. Some degree of reorganization of sections is under way in order to undo the effects of a dues and assessment policy adopted two years ago and quickly thereafter abandoned.
3. A complete definition of the electrical manufacturing industry as a whole and of each of its nearly 175 sections, groups and sub-groups is being completed, partly through ironing out conflicts between different sections of N.E.M.A. and partly through finding the solution to conflicts between the electrical manufacturing industry and other codified industries. This program follows certain basic principles laid down by a "products scope" committee.
4. The staff of the organization has been reorganized into seven departments, each with a departmental director and assisting staff. These departments are:
   (a) Code administration.
   (b) Uniform legislation.
   (c) Engineering.
   (d) Uniform accounting and statistical.
   (e) General service.
   (f) Accounting, auditing and office service.
   (g) Financial.

Of these at the present time the code administration department is substantially the largest, but every department in existence in N.E.M.A. prior to 1933 is still maintained and the force of all of them has been increased and strengthened.

We do not wish to suggest that a degree of perfection has been reached. Indeed, we do not contemplate that perfection ever will be reached. Any live industry and its live trade association must always be flexible and ready at any time to take on new objectives, to change its policies and to adjust itself and its organization to the requirements of the situation. It is essential, however, that the changes in association affairs shall have some rhythm to them, that adjustments should be made constantly and that there should be no stoppage of adjustment, for such stoppage should be the first sign of upheaval that would sooner or later take place. Open-mindedness, receptivity to new ideas; indeed, the seeking of new ideas and new plans is, in times like these, always one of the great essentials of trade association success.

Fear Retards Recovery

WENDELL L. WILLKIE

The fear of American industry today is the fear of the hostile attitude of Government itself. The violent criticism of American industry, the drastic and crippling legislative measures which are proposed to reorganize and regiment American business have prevented a restoration of confidence and have retarded the resumption of business activity.

If the electric utility business were freed from these threats it would do more to lift this country out of the depression, take more men out of the bread lines and off relief rolls than any other industry, and with the multiple effects of restored confidence, expanding credit and the restoration of faith on the part of capital investors, *do more than the government itself can do with all of its expenditures.*—By Wendell L. Willkie, President Commonwealth & Southern Corporation.

Values in Purchasing

A Method Used to Appraise Proposals—Based Upon Lowest Cost During Life—Technological Progress Rapid and New Equipment Is Now Economical

By L. B. BONNETT
Purchasing Agent
Brooklyn Edison Company

DURING these later years of the depression, while the construction programs of public utilities have been making slow progress, the manufacturing industry has not stood still in its development of new ideas in preparation for that time, which is certain to come, when improvements and extensions become economically justified and necessary for the carrying of load. This issue of the ELECTRICAL WORLD gives a broad picture of some of these new ideas. Perhaps more developments have taken place in these few years than in any corresponding period for some time back, because wide-awake manufacturers have realized that this was a time when development could be thought through and experimental work carried out without the distractions of a heavy production program.

The public utility engineers also have been alert in thinking of the future. The time is soon to come, and is already here in some cases, when the utilities will be actively planning the next steps in extensions of their facilities and all these improvements and developments that have been taking place will have their opportunities for analysis from the point of view of the purchaser and user. Obviously, if we duplicate what was good practice of a few years ago because our experience with such equipment has been excellent, we may find that the world is moving on ahead of us. On the other hand, some of the developments about which we have been hearing may not yet have reached the stage where they are economically suitable for present installation, and it would not do for our enthusiasm for what is newest to lead us into investments which are not justified by the probable results.

In making improvements or in extending our present facilities it is clear that we want equipment of the lowest over-all cost during its entire life. This requires a consideration of first cost, of the cost of operation and the cost of maintenance, and the best possible judgment as to the useful life and the load which will be carried during that useful life. It may be of interest to describe a procedure for purchasing which helps to bring about this careful analysis.

This procedure as carried out in the Brooklyn Edison Company might be considered in four parts:

1. The preparation of the specification by the purchaser.
2. The preparation of propositions to meet this specification by the manufacturers.
3. The evaluation of the different manufacturers' propositions by the purchaser.
4. The final decision as to selection.

1. It is our belief that when we are in the market for equipment it is advantageous to open the field as widely as possible to competitive ideas. Hence, the preparation of the specification is of the greatest importance. In order to take advantage of the improvements in design and method which have been taking place there should be the fewest possible limitations as to details of construction. An example of freedom from undue restriction in the specification is a recent contract for certain building maintenance work at a generating station. One general contractor's bid was $6,000 lower than the best of his competitors. A careful investigation with him, to see if he had not made an error, disclosed that he intended to use certain ingenious methods which made it quite probable that he could do the work at his low price with a satisfactory profit. Both he and we benefited from his ingenuity.

The specification should cover only those requirements which are absolutely necessary to define the outline of the problem and which cannot easily be changed. For example, if a turbine is to be purchased the kilowatt capacity (there might even be leeway here), the steam pressure and superheat, the voltage and frequency at the switchboard are necessary limiting conditions. The space to be used may be inflexible. The quantity of steam available might in some circumstances be substituted for kilowatt capacity.

The specification should state the method which will be used in evaluating difference in efficiency or other performance data. It will be helpful to plot an expected load duration curve; that is, a curve showing, for each load point, the hours of use. From these data the manufacturer can calculate the annual loss or the annual heat input. Perhaps the best point of efficiency can be shifted in the design so as to bring it at or near the load of maximum use. Or perhaps the shape of the efficiency curve can be flattened with not too large a cost to give best performance over a range of load. When the cost of the losses or the heat input and the method of capitalizing these losses are given the manufacturer will see how far he can go in cost increases to get improved performance.

General information as to the use of

the station, whether it is to be a base-load operation with long hours in service or whether it is a standby, whether or not the turbines must be capable of quick starting and other peculiar conditions as to the results to be obtained (not the method of obtaining them) will be helpful. The whole purpose is to give to the manufacturers the underlying limitations of the problem with the widest possible latitude for them to work out the details of their design.

2. This specification prepared by the engineering department is then transmitted to the manufacturers with a request for bids. From it they have, as clearly as possible, the background and outline of the problem to be solved and have the opportunity to incorporate in their designs and to present for consideration all the improvements in operating characteristics that they have been developing. When this specification has had a preliminary study many questions may arise as to detail and the freest possible conference and discussion between the engineers of the purchaser and the representatives of the manufacturers should take place, in order to be sure that the problem of the purchaser is fully understood. In such discussions the manufacturer is invited to suggest any alternatives.

3. The manufacturer is requested to submit his formal proposals in two parts: First, the complete description of his equipment and its performance, but without price; second, the price separately.

The performance data without price are then sent to the engineering department for study and for comparison with the proposals of other manufacturers. It is recognized that *the selection of the best equipment for a given set of conditions must be a matter of judgment and cannot be decided solely upon the results of a rigid mathematical formula. However, the more informed and analytical the judgment the more nearly correct will be the answer.*

The efficiency guarantees in the proposals can be translated into terms of dollars of cost to the purchaser through the use of the expected load duration curve previously mentioned. In making such calculations, we believe it is sound policy to take the performance guarantees at their face value, since it is our practice to test all equipment after installation to insure that guarantees are met. If the equipment does not perform as promised, the manufacturer is expected to make such changes as may be necessary, until the guarantees are fulfilled. It is, therefore, incumbent upon the manufacturer to see that he has sufficient margin in his guarantee to cover the contingencies of manufacturing, but not too large a safety factor as to make his proposition less attractive than that of his competitors. Guarantees greatly out of line, either high or low, would be a subject of consultation with the manufacturer to make sure that no mistake has been made. Differences of losses of different proposals when properly capitalized will give the differences in price which might be paid for such equipment based upon these tangible valuations.

Intangible must be weighed

There are characteristics other than the performance data on which opinions only can be formed, such as past experience in operating similar machines, confidence in the design from the viewpoint of freedom from trouble, the type of service to be expected. It is important to try to analyze the real value in dollars of these intangible characteristics, asking and answering the question as to how much money should be paid, if necessary, in support of the opinion of superiority in these characteristics. It is our belief that these conclusions can be reached with more freedom from prejudice if they are considered without knowledge of the prices.

It is interesting to note that as experience has grown in handling this evaluation process the less important these intangible items seem as between reputable manufacturers, and the more probable that the relative merits of the propositions will be determined primarily, if not entirely, by the tangible results of the efficiency calculations.

4. When the relative values to us as the purchaser have been so determined, the combination of these, with the prices offered, gives usually an unmistakable answer as to which equipment is the best for our purpose. Often this is not the one with the lowest cost, and for that reason the basis for the arithmetic evaluation must be one that clearly justifies the actual expenditure of corresponding dollars. On the other hand, it is surprising how often the most desirable proposition also has the lowest price. Perhaps this may result from the fact that an *organization which is capable of the finer design is equally capable in its manufacturing division to do its work economically, resulting in the most efficient machine at a clearly competitive price.*

Plan used for fifteen years

The procedure outlined here is not theorized as to what might be done. This plan has actually been in effect in the Brooklyn Edison Company for some fifteen years back and under its operation all the material for our Hudson Avenue generating station has been purchased. The results of such careful analysis may be seen in certain characteristics of this station as it has developed. During the period from 1920 to 1930 there was much progress in technical design. The station originally was designed for eight 50,000-kw. units, but as this station grew from its beginning of two units to its completion with eight units the size of the unit as installed had grown from 50,000 kw. to 160,000 kw. There was comparatively little duplication.

Each step of the development as it occurred was given fresh consideration in order that the best unit, both in the turbine house and in the boiler house, might be selected, taking advantage of all the technical progress to date. As a result of this study, the steam pressure and temperature were increased in the middle of the station. One row of boiler equipment is designed for preheated air. Induced draft fans were used in the later units and many changes incorporated to enable us to get more than three times the capacity within the same floor space per unit as originally intended for 50,000 kw.

Because of this process of careful selection for each purchase this now completed station has an exceptionally low investment cost per kilowatt. Through the meticulous care in the analysis of details of construction, of which the purchasing procedure is symptomatic, the station has shown outstanding dependability.

To sum up, the purchasing plan discussed has behind it a satisfactory experience over a term of years as applied to the development of a large steam generating station as well as to other and less spectacular purchases; it encourages the manufacturers to present their very best possible performances, knowing that their relative values will be carefully analyzed, and it results in the selection of the most suitable equipment after a thorough investigation of every factor which has a bearing on its ultimate cost.

An Exhibit in Print

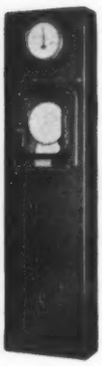
NEW AND IMPROVED ELECTRICAL PRODUCTS • • DEPRESSION CONTRIBUTIONS IN INVENTION, DESIGN AND MANUFACTURE

• ON THE THRESHOLD OF RECOVERY, it is all important that the industry be brought up to date in regard to the things it has to use and to sell. A knowledge of new electrical products and of the improvements in old products is necessary to intelligent cost reduction in operation and an expansion in sales. The exhibit in print in this issue is made possible by the co-operation of the manufacturers of these products. It should afford a stimulus to all electrical men and lead them to the knowledge of new equipment essential to further industry growth.

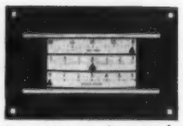
• ELECTRICAL EQUIPMENT shown gives a cross-section of typical developments. It is indicative of the magnitude and scope of the apparatus now available to the industry. It is representative only. It is impossible, because of space limitations, to show the enormous number of new devices now available.

• THIS SERVICE is afforded at a time that corresponds to the product exhibits shown at the old N.E.L.A. conventions held in Atlantic City. This number is the Edison Institute convention issue and this meeting, the present stage of business recovery and the season of the year unite to make it both opportune and valuable. It is a time for aggressive action with new things.

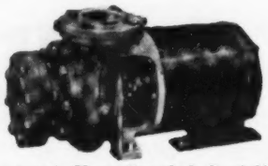
DEVELOPMENTS IN POWER STATION APPARATUS



Multi-Point Draft and Pressure Indicator — Sensitive, easy to read and calibrate, interchangeable elements, two to sixteen units.—**Republic.**

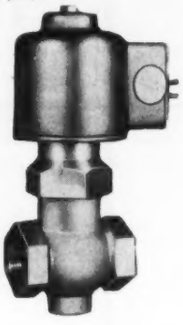


Low-Cost Supervisory System — Battery-operated, two-wire, all-relay-control, permits five pieces of apparatus at any one location to be selected and supervised.—**General Electric.**



Compact Close-Coupled Centrifugal Pump—3 to 600 g.p.m., heads up to 189 ft. Single shaft. One-piece bronze impeller. With or without water seal.—**Chicago Pump.**

Flow Meters for Hydraulic Units—Indicate and integrate water flow. Connected to scroll case.—**Bailey Meter.**

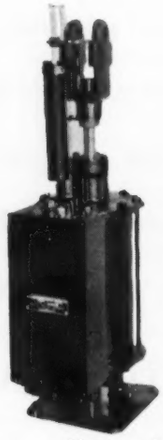


Solenoid-Operated Valves — For air, gas, water, steam, oil, chemicals, "Freon," methyl-chloride and brine — ¼ to 6-in. pipe size.—**Automatic Switch.**

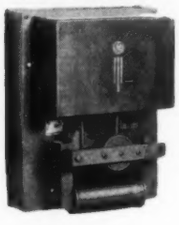
Smoot Regulator—Compact and flexible in installation, regulates magnitude of pressure, flow, level or speed.—**Smoot.**

ON B.T.U. SIDE

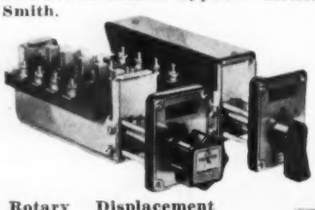
Combustion of practically any combination of fuels is feasible with new mixing burners and the process is under full control with the extended lines of meters and control mechanisms afforded. Stokers are greatly improved. Furnace integral with the boiler has been another innovation. Air preheaters, superheaters, economizers have made notable progress, considering limitations of new construction. New condenser tube alloys, new pumps, electrically operated valves, etc., constitute a noteworthy contribution.



Generator Voltage Regulators—An entirely new line incorporating a torque-motor type of voltage-sensitive element and a directly operated rheostat of outstandingly new design.—**General Electric.**

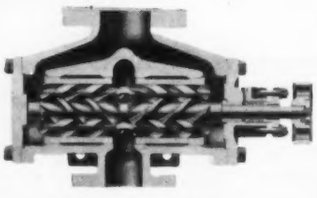


Rotary Switches — Instrument and control, for circuit breakers and electrically controlled apparatus. Silver-insert contacts. Molded bakelite structure. Type R.—**Roller-Smith.**

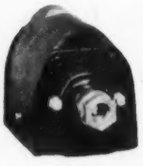


Air-Operated Combustion Control—Operates boilers to maintain steam pressure through furnace draft and fuel feed control. Free-floating air pilot valve actuates control drives.—**Bailey Meter.**

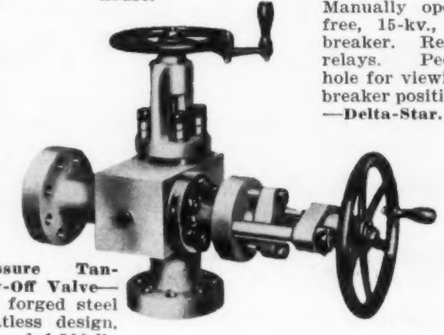
Rotary Displacement Pumps — For fuel or lubricating oil. Motor unit (½ hp.), pumps 2½ g.p.m. of bunker C oil at 180 deg. against 100 lb. per sq.in.; turbine unit, 150 g.p.m. at 150 lb.; turbine-gear unit, 90 g.p.m. of 1,000 SSU oil against 300 lb.—**DeLaval.**



Electrically Operated Check Valve — For compressed air and liquids. Suitable for whistle, hot or cold water line, etc. — **Westinghouse.**

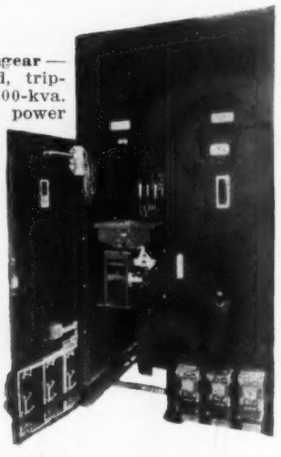


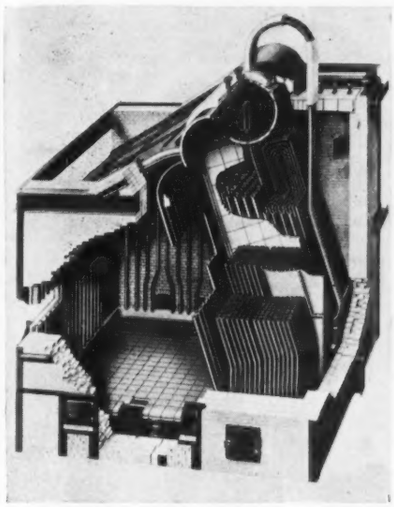
Polaricode Jr. Supervisory Control—For small-station remote operation, suitable for industrial use (automatic railway, mining, pumping, substations, etc.). Operates up to five units. Two-wire line.—**Westinghouse.**



High-Pressure Tandem Blow-Off Valve—One-piece forged steel body, seatless design, for 600- and 1,500-lb. service.—**Yarnall-Waring.**

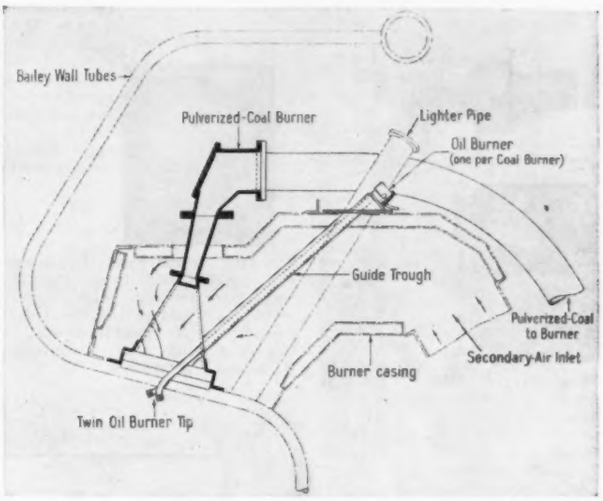
Metal-Clad Switchgear — Manually operated, trip-free, 15-kv., 150,000-kva. breaker. Reverse power relays. Peep-hole for viewing breaker position.—**Delta-Star.**



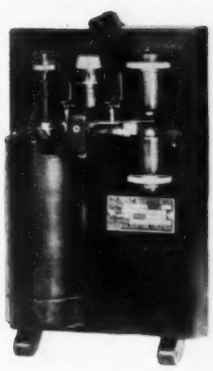


Integral-Furnace Boiler — Completely co-ordinated steam-boiler unit. For small or large power plants. Burns any combination of fuels. Easy ash removal. Steam dry. Small headroom. Hand, automatic or remote control. Low maintenance cost. — **Babcock & Wilcox.**

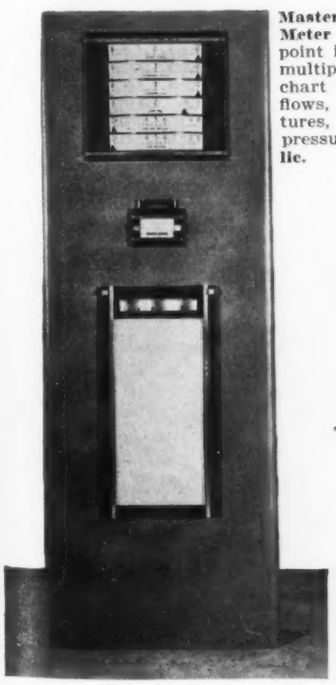
Combination Coal and Oil Burner— For water-cooled furnaces. Burns pulverized-coal in multiple intertube burner and oil in twin-nozzle burner. **—Babcock & Wilcox.**



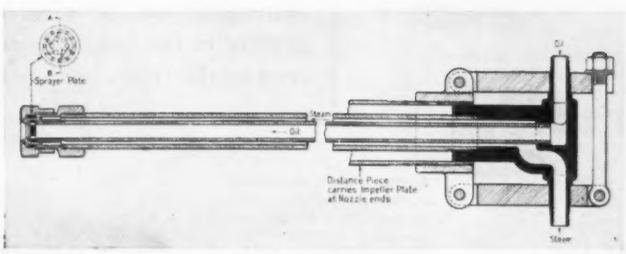
Load Telemetering and Totalizing — Micromax (a) station load recorder and (b) system load recorder and retransmitter and thermal converter (c) for load transmitting. One-hour block demand and kw.-hr. consumption recent features.—**Leeds & Northrup.**



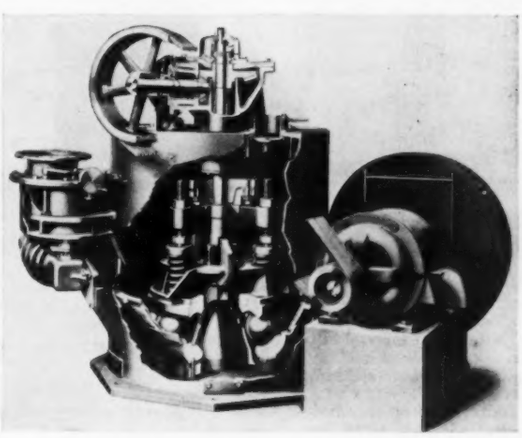
Contact-Making Voltmeter— More than 90 fewer parts than previous design, for use with induction voltage regulators.—**General Electric.**



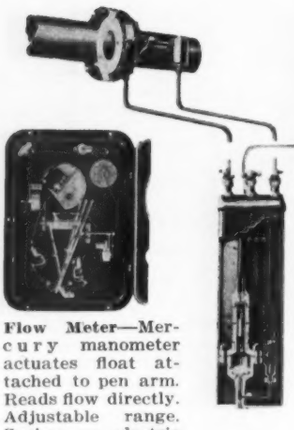
Master Boiler Meter — Multipoint indicator and multiple strip-chart recorder for flows, temperatures, drafts and pressures.—**Republic.**



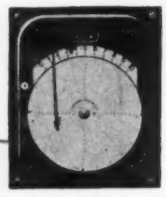
Steam-Atomizing and Wide-Range Oil Burners — Steam atomizes tar, pitch, acid sludge and heavy oil of refinery. Short, turbulent flame. Single nozzle plate for all capacities. Output varied by fuel and steam pressure. Similar construction but different sprayer plates take primary oil through outer annulus and secondary oil through central tube. Two meet at one nozzle. Four to one capacity variation obtainable. — **Babcock & Wilcox.**



Small Capacity Pulverizer —On ball-bearing principle. Compact, suitable for location at boiler. One motor. Consistent fineness, low power consumption. Handles wet coal.— **Babcock & Wilcox.**

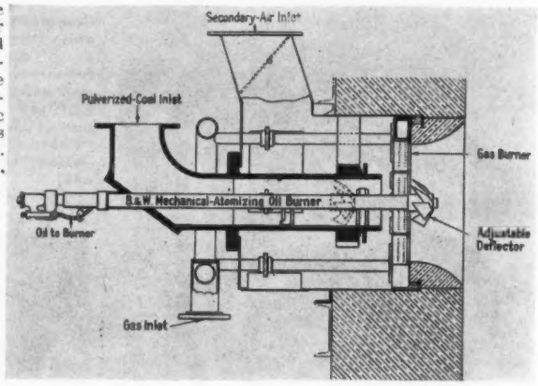


Flow Meter—Mercury manometer actuates float attached to pen arm. Reads flow directly. Adjustable range. Spring or electric clock.—**Bristol.**



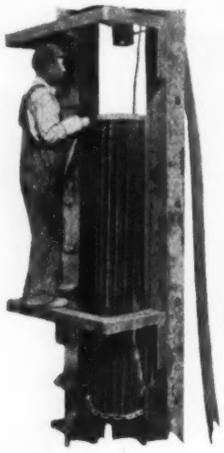
Integrating Electric Flow Meter— For measurement of fluid flow. Pressure differential across orifice actuates sensitive relay controlling electric motor which operates registering mechanism. —**Cochran Corporation.**

Circular Multi-Fuel Burner— For combination firing through refractory burner walls. Liquid, gaseous or pulverized fuels separately or in combinaflon. In timate mixing, high turbulence. —**Babcock & Wilcox.**

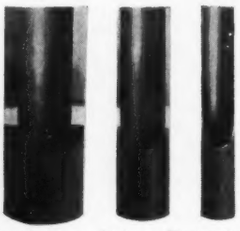


ON THE KW. SIDE

For the electrical end of the generating plant there have been introduced improved and simplified forms of load telemetering and totalizing as well as of load-frequency control. Still closer to the generator are improvements in voltage regulators incorporated from companion areas. Supervisory systems have undergone simplification for limited functions as well as of a broadening of scope. Metal-clad switchgear has had new features to offer in the last two years covered by the typical presentations.



Fluted Steel Piling Shell—For foundations. Driven quickly with ordinary crane and hammer. Light weight. Cut with acetylene torch. Filled with concrete.—**Union Metal.**

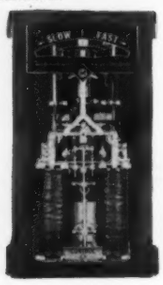


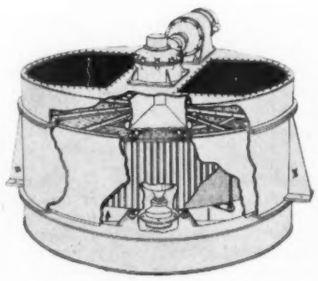
Condenser Tubes Extruded, Rolled, Drawn— Smoother, cleaner surfaces, fine-grained structure. Copper-nickel in 70/30 proportions provides resistance to corrosion and erosion.—**American Brass.**

Mechanical Flow Meter — Designed for installations where remote registration is not required; 12-in. chart. Synchronous motor-driven integration. — **Republic.**

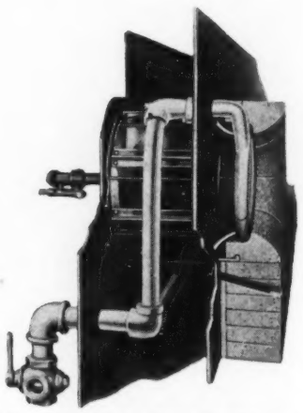
Limitorque Electric Valve Operator—Self-contained, self-lubricating. Protected against obstruction. Dust and moisture proof, for indoors or outdoors. —**Philadelphia Gear.**

Automatic Synchro-Operator— For frequency matching. Indicates phase-angle difference and relative speeds. Either a.c. or d.c. control. — **Allis-Chalmers.**



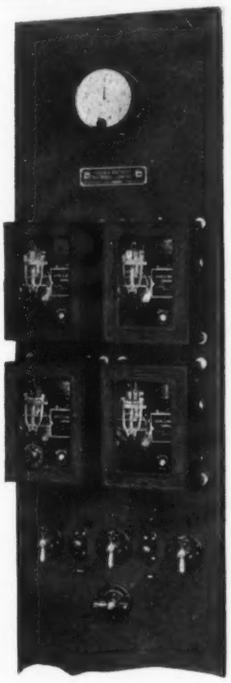


Ljungstrom Air Pre-Heater— Regenerative type, center drive, center support, thrust bearing at top, guide bearing at bottom assures permanent centering of rotor. — **Superheater.**

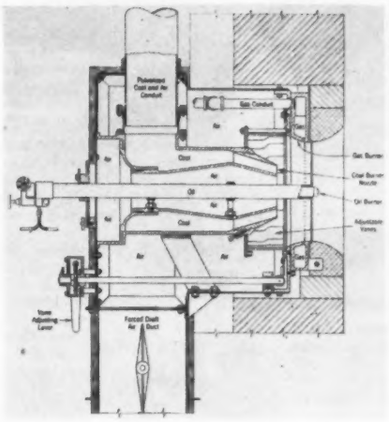


Combination Oil and Gas Burner— Gas broken up into small streams, discharged into combustion air. Combined with mechanical atomizing oil burner. Made for heat liberation up to 70,000,000 B.t.u. per hour (natural gas).—**Babcock & Wilcox.**

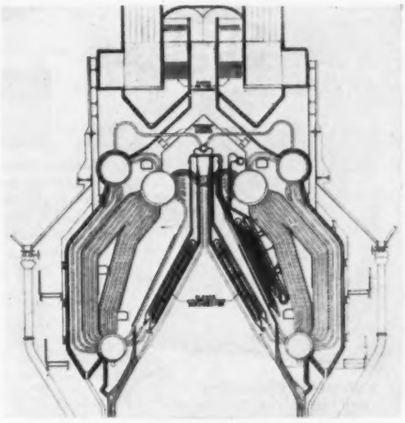
Load-Frequency Regulator—Apportions load and regulates frequency. On isolated system frequency is held and generator loads prorated on basis of ratings or



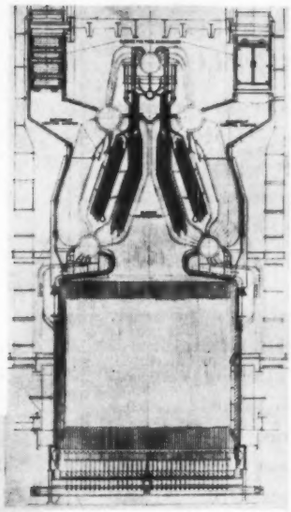
efficiencies On interconnected system tie-line load held constant or frequency regulation assigned to area of load-swing origin.—**Leeds & Northrup.**



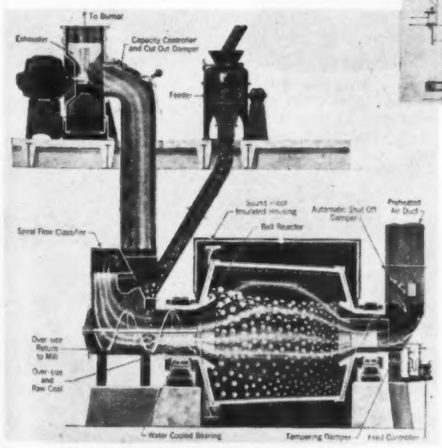
Combination Burner—Intervane whirling-air type. For oil, gas, or pulverized-fuel. Rated up to 120,000,000 B.t.u.s per hour. Cross jet intertube type fire between arch or water-wall tubes up to 150,000,000 B.t.u.s per hour.—**Foster Wheeler.**



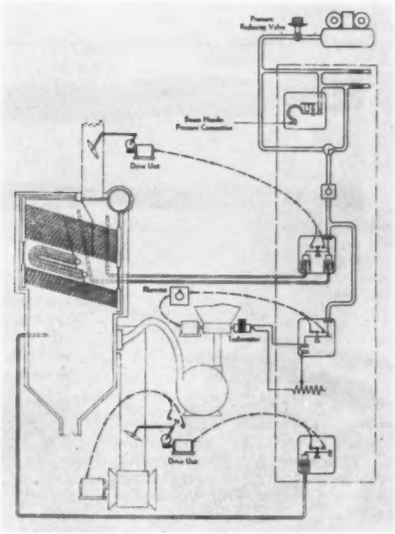
Superheater and Economizer—Elesco compensating superheater and Elesco fin-tube economizers applied to new Connors Creek boilers (Detroit). Dampers give constant superheat from 30 per cent to full load by proportioning gases over halves of superheater.—**Superheater.**



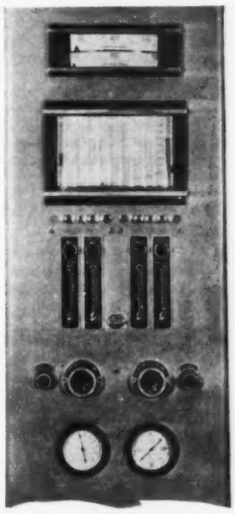
High Superheat at Rouge Plant—Ford applies to high-pressure boiler Elesco superheater for 1,400 lb. and 900 deg. temperature (60 per cent of peak load). Temperature constant at high rates, gases by-passed about superheater. Elesco fin-tube economizers have continuous loop construction, all joints eliminated.—**Superheater.**



Ball Pulverized Mill for Fluctuating Loads—Constant fuel level maintained in barrel by suction pipes attached to mercury-sealed float bell controlling coal feed. Rejected output returned to mill inlet.—**Foster Wheeler.**

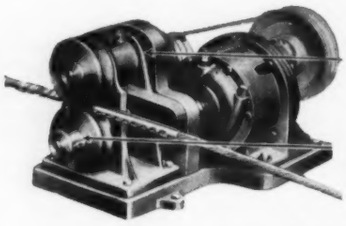


Metermax Combustion Control—Unit control assures high boiler efficiency, uniform furnace conditions and constant steam pressure. Balances metered air and fuel against air loading pressures.—**Leeds & Northrup.**

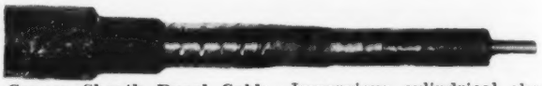


Master Control Panel—For four boilers, mercury gages indicate fuel-air ratio; settings changed by ratio adjusters, centralized control.—**Smoot.**

Coupling Capacitor — New unit for use with carrier-current equipment.—**Westinghouse.**



Hollow Copper Conductor—Type AS, elliptical key wires hold grooved copper strands together. Flexible; easily spliced, minimum corona loss.—**American Steel & Wire.**



Copper Sheath Rural Cable—Impervious cylindrical sheath forms return grounded conductor. Inner conductor paper insulated, high dielectric and impulse. Underground or aerial (no messenger) service.—**Anaconda.**

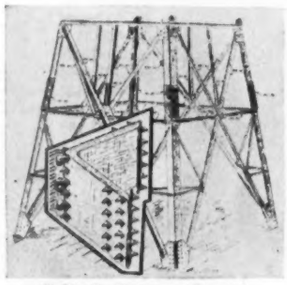
Sleeve and Sleeve Machine—For field or storeroom, 4/0 stranded to No. 17 solid. Five-ton pressure insures good joint.—**Kearney.**

Ladder Mount for Truck—Rotates 360 deg. Can be locked in any position and elevated to six angles. For inspecting and servicing street lamps, overhead, tree trimming, etc. — **Electric Service Supplies.**

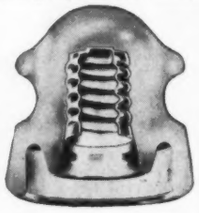
Brass Bushed Glass Insulators—Bushing inserted into hot plastic glass during forming. Smooth, perfect pin threads, eliminates breakage due to pin expansion, no radio interference, increased mechanical strength, higher dielectric properties.—**Hemingray-Owens-Illinois.**

TRANSMISSION DISTRIBUTION

To help operators secure greater service reliability, isolate faults, improve voltage regulation and minimize the combined fixed and operating charges, here are such things as copper-sheathed cable and high-strength conductor for rural lines; hollow-conductor cable to minimize corona; vibration dampers and clamps; rugged and stronger insulators; transparent suspension insulators; brass-bushed glass insulators; moisture-proof bushings; unit substations and metal-clad switchgear.

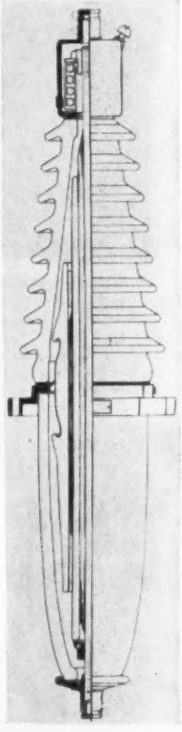


Spiked Tower Guard—Discourages climbing, closely spaced steel points, clamps on any shapes (1½-6 in.). Holes for removable steps.—**Smoot-Holman.**



Cementless Bushing — Spring under head of conductor tube in oil reservoir compresses porcelain. Assures oil tightness and permits field repairs.—**Ohio Brass.**

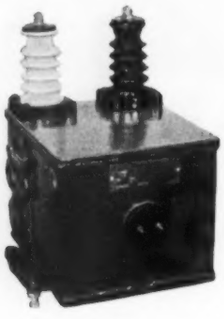
Extra Rugged Insulators—Pin type, for use near schools, railroad tracks, etc., where stone throwing and shooting prevail.—**Jeffery-Dewitt.**



Potential Transformers — Stronger coils, shielded, co-ordinated insulation, gives bushing flashover, ratio constant within 1 per cent to rated burden. Types PT and PTO, up to 13.8 kv.—**Westinghouse.**

Three-Wire and 2-Wire Conductors—Copperweld-copper, for lightly loaded power lines, rural lines with long spans, small sags and high factors of safety.—**Copperweld Steel.**

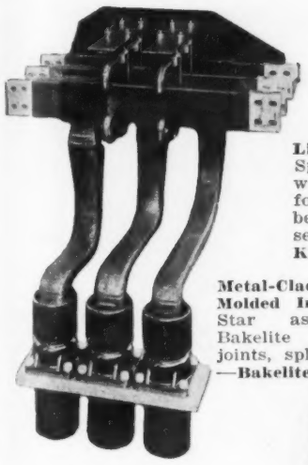
Unit Type Substation—For suburban and rural communities, usual sizes 750 kva. for one or two low-voltage feeders and 1,500 kva. for more.—**General Electric.**

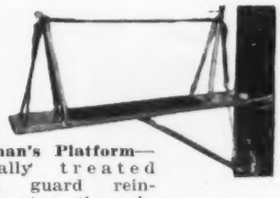


Blackburn Cable Rings—Spiral grip, will not jump off messenger wire, packed not to tangle in shipment.—**Chance.**

Conductor Vibration Damper—Stockbridge design for aluminum, copper, copperweld, bronze and steel conductors. Easily installed on live lines.—**Aluminum Company of America.**

NEW DEVELOPMENTS IN TRANSMISSION EQUIPMENT





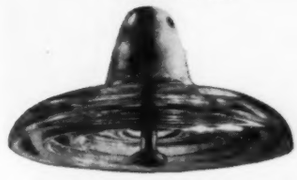
Lineman's Platform—Specially treated wood, guard reinforces strength, rubber mats available for secure footing. —**Kearney.**

Metal-Clad Switchgear with Molded Insulation — Delta-Star assembly employs Bakelite for covering tap joints, splices and supports. —**Bakelite Corp.**

Guy-Wire Protector — End clamps facilitate attachment or removal. Lower clamp attached to anchor.—**Line Material.**

Seep-Proof Bushing — Dry-type for conservator transformers of lower distribution voltages. Bronze insert ground to flat surface. Cork gasket held in compression. —**Ohio Brass.**

7½-Kv. Dredge Cable of Record Size —Rubber jacketed, 4¼ in. diameter, 750,000-circ. mil conductors, tinned copper braid shield; 14,000 ft. to operate dredges or boosters at Fort Peck Dam; 7,000 hp. at 6.6 kv.—**American Steel & Wire.**

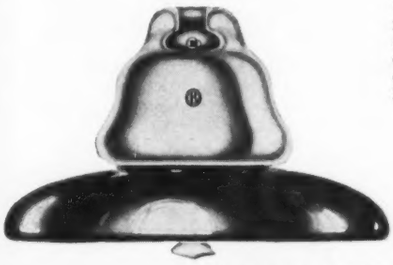


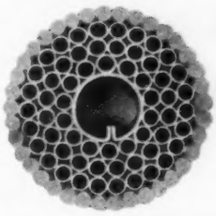
Pyrex Suspension Insulator — Non-crystalline, non-porous, no glaze, transparent, cementless, one-piece, high dielectric strength.—**Corning Glass.**

Swamp Anchor — Pipe spreads as screwed into anchor, locking it, anchor screws out intact, no set-screws. Hole in hub for moistening soil.—**Chance.**

Clamp with Vibration Damper — Conductor held loosely in cradle-like support. Spring rigidly clamped to cable at ends damps vibration waves and minimizes fatigue factor.—**Westinghouse.**

Concentric Bare Neutral Cable — From pole to range as drop, entrance and appliance conductor. Tamper-proof, economical wiring. —**Habirshaw.**





Hollow - Conductor Cable — Core hollow, strands hollow or solid as required. flexible, and of equivalent strength.—**Phelps-Dodge.**

Lineman's Safety Belt—Leather of Graton-Knight tanning and fabrication, rivets and burrs of stainless steel, forged D rings, rawhide liners, 3, 4 or 5-in. pads.—**Davis.**

Stronger Suspension Units—Three 6 and 7½-in. units rated 8-15,000 lb.; four 10-in., 15,000 lb.; two 10-in., 25,000 lb.; one 12-in., 36,000 lb. —**Ohio Brass.**

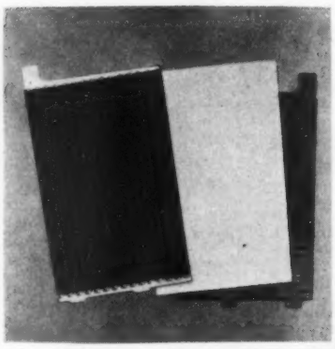
Tellurium - Lead Battery Plates — One-piece positive plate. Unusually rugged. Long service life. Cold worked by swedging process. Twice strength of pure lead. Reinforcing ribs.—**USL Battery Corporation.**

Three - Way Expansion Anchor—Three sizes give wide range of holding power for 8-in. anchors, all fit 8-in. hole, certified malleable castings give long life in soil.—**Kearney.**

Balanced Anchor — For use as expanding anchor, cone anchor or dead-man. Three or four blade. Called "Wej-Lock." —**Chance.**

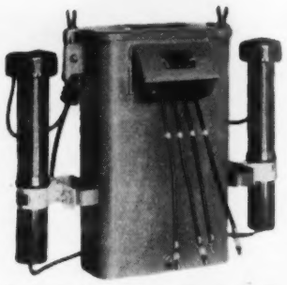
Full-Vu Guy Guard—Adaptable to any down guy, clamps attachable at any point, covers assembly. 3½ in. diameter for sure visibility.—**Kearney.**

NEW DEVELOPMENTS IN TRANSMISSION EQUIPMENT

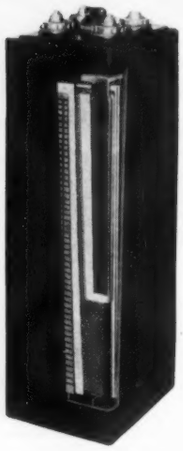


Sheet Rubber Battery Separators—Permits free diffusion of electrolyte. Not affected by electrolyte. Immune to heat. Withstands vibration and rough handling.—**Electric Storage Battery.**

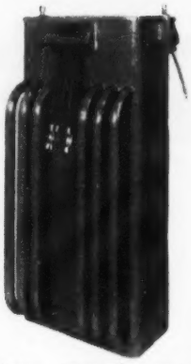
Portable Phantom Load—For regular or extended duty cycles. Excellent wave form. Relatively light. Thirteen current steps for 25-amp. loads, one additional for 50-amp.—**States.**



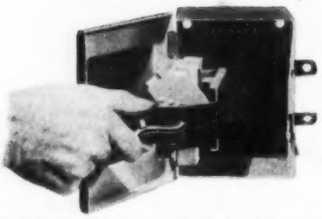
Surge-Proof Transformer—For 6,900/11,950 Y-volt rural lines up to 25 kva.—**Standard Transformer.**



Armored Kathanode Cell—Used for substation service where rubber jar is preferred. 90 to 1,000 amp.-hours.—**Gould.**



Rugged Insulator—Specially designed for lines where malicious breakage is experienced.—**Locke Insulator.**

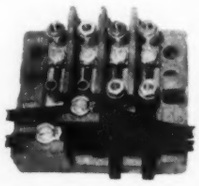


Radiator Transformer—For 75 and 100-kva. Copper-bearing steel tubes welded to steel case. Light and small.—**Standard Transformer.**

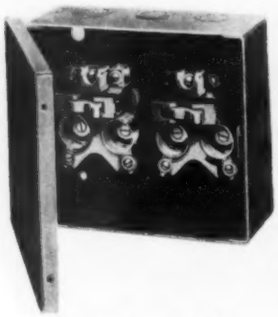
Liquid Fuse—For cubicles or cell structures. Heavier arcing chamber. Dielectric liquid practically insensitive to moisture.—**Schweitzer & Conrad.**

Swing-Out Interior Switch—Entire box area accessible for wiring and conduit connections. One-piece combination jaws and connectors. Arc suppresor.—**Square D.**

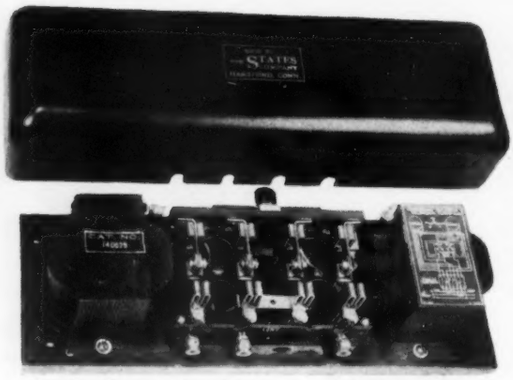
Noiseless Insulator—For conditions where interference is traceable to pin-type insulators. Noiseless wet or dry. Unaffected by loosening tie wire.—**Locke Insulator.**



Sliding-Link Test Block—Bus connectors for grouped meters. Eliminates two contact points and soldered taps.—**States.**



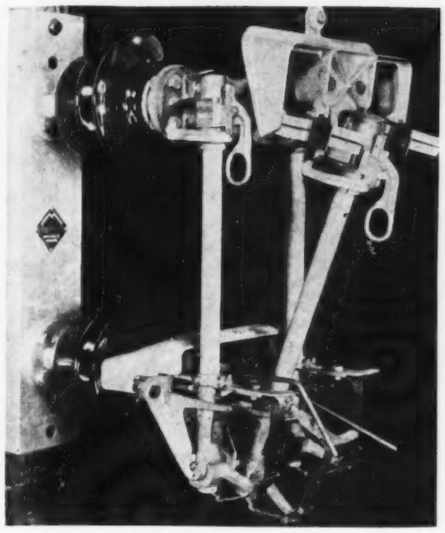
Water Heater Switch—For 2-element heaters. Applicable to combined off-peak, on-peak heating.—**Square D.**



Quadraphaser—Provides 90 deg. lagging potential from normal supply, permitting standard watt-hour meter to register reactive component. Double-throw switch gives RVA or watt-hour registration.—**States.**

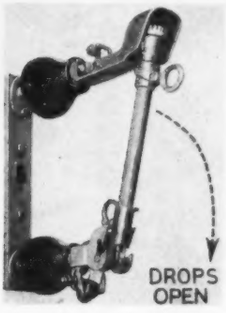
Safety Switch—For 575-volt service. Dual break in each leg reduces arcing. Unit block for easy cleaning and repair.—**Colt's Patent Fire Arms.**

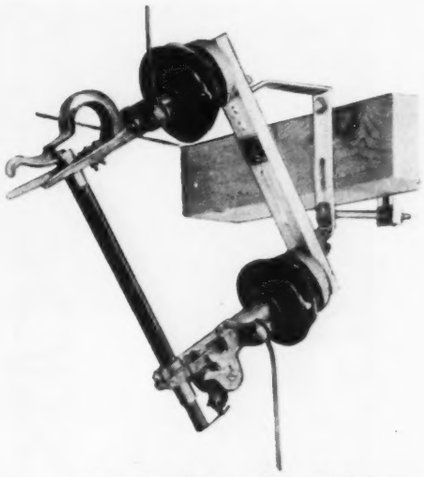
NEW DISCONNECTS, FUSED SWITCHES, CUTOUTS



Fast Reclosing Fuse-Switches—Restores circuits twice before locking out. Rupture 33,000 kva. per phase. Recloses in 6 to 20 cycles. Ratings—7½ to 34½ kv.—**W. N. Matthews.**

Open Cutout—Sleet protection, positive indication of unblown or blown fuse link, free venting fuse tube, called "Semafor." Will operate dependably on low faults and heavy short circuits.—**Schweitzer & Conrad.**

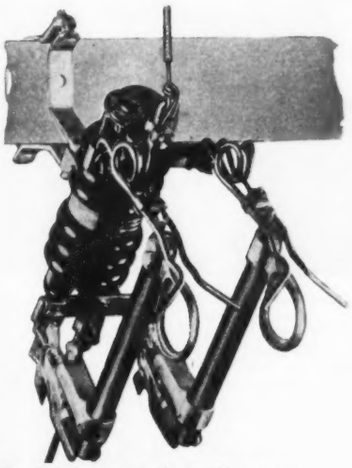




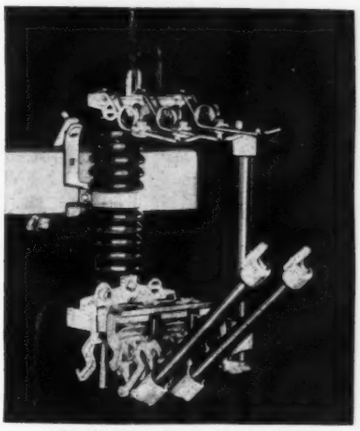
Drop-Out Fuse Switch—Full floating upper contact, wide variation in length of fuse holder permissible. Type ES-3.—**Pacific Electric.**

FUSE SWITCHES

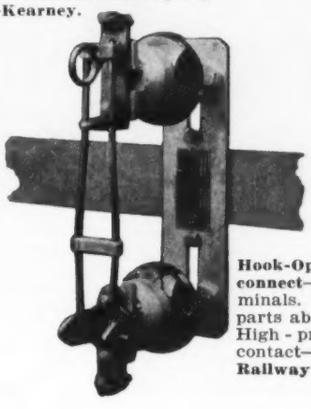
Continued demand of operators for cheaper primary load-interrupting devices usable on lightly loaded lines or at positions that do not justify the expense of oil breakers but still require automatic reclosure has brought forth an array of fused primary switches. Disconnects better adapted to operating conditions; simplify installation, minimize insulators and reduce maintenance. Indicating cutouts in prominence. Variety of fuses to fit all makes of primary units. Interlocking for disconnects and safety switches.



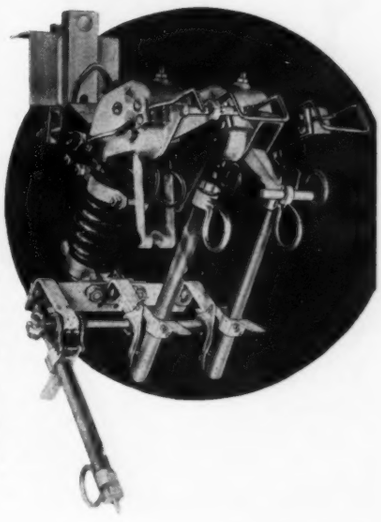
Dual Trip-Out Switch—One cartridge fused with heavy amperage link, other with small amperage, facilitates routine fuse inspections without interrupting service.—**Kearney.**



Reclosing Type Fuse Switch—Simple operation, error-proof (must be cocked for next operation before blown cartridge can be removed). Each cartridge makes direct line contact.—**Kearney.**



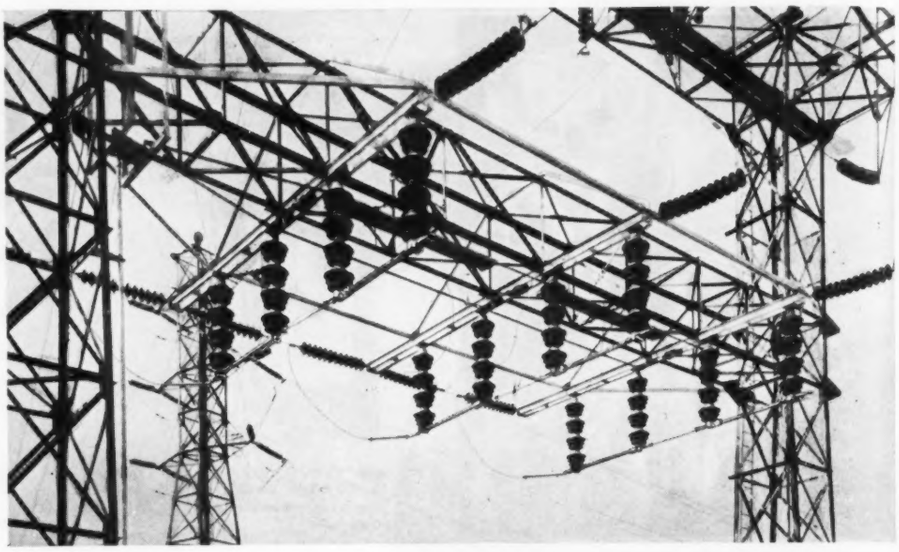
Hook-Operated Disconnect—Clamp terminals. Non-ferrous parts above insulators. High-pressure spot contact—Type R.D.—**Railway & Industrial.**

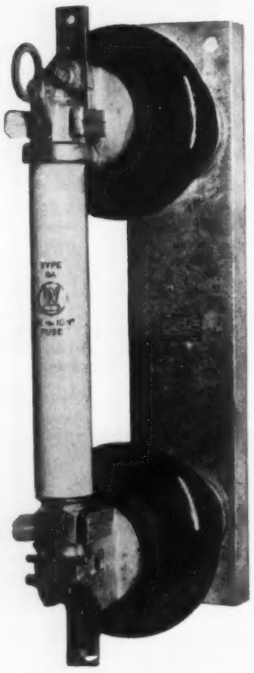


Reclosing Cutout with Adjustable Time Delay—Built-in time-delay acts on transfer switch, which closes circuit to adjacent cartridge after one fuse has blown. Two "Sylphon" bellows filled with non-freezing liquid. Available for 100 amp. (max.) in two and three units for 5,000-, 7,500/12,500- and 15,000-volt operation.—**Line Material.**

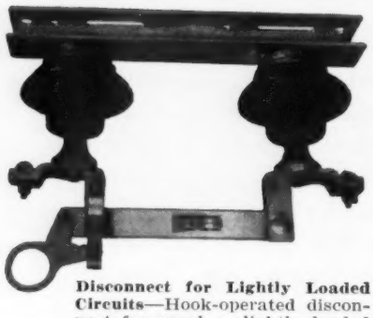
NEW DISCONNECTS, FUSED SWITCHES, CUTOUTS

Side Break Switch—Rotating insulator, N.E.M.A. specifications. May be had in 92 kv., 115 kv., 138 kv. and 161 kv. sizes, in 600 and 1,200-ampere capacities.—**Line Material.**

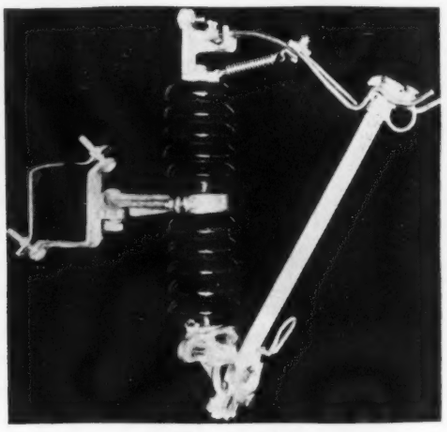




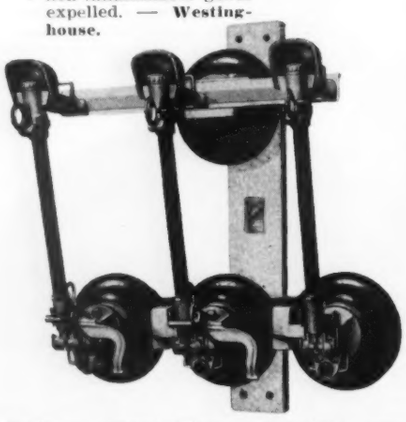
De-ion Power Fuse — Interrupting capacity up to 600,000 kva. at 23 kv., three-phase. Other ratings 7.5 and 15 kv. Large and small bore responds to high or low fault current. Quickly renewable. Dry type. Only non-inflammable gases expelled. — **Westinghouse.**



Disconnect for Lightly Loaded Circuits—Hook-operated disconnect for rural or lightly loaded circuits not requiring ratings in excess of 400 amp. where economy is first consideration, but not to extent of impairing service. Universal steel base for double crossarm spacing about equal to switch insulator spacing. No interference between crossarm and insulator bolts facilitates insulator replacements. Embodies non-ferrous parts on "hot" side, self-aligning contacts, safety latches and solderless lugs. Type RFB-2C in 7.5 to 15kv. ratings.—**Delta-Star Electric.**

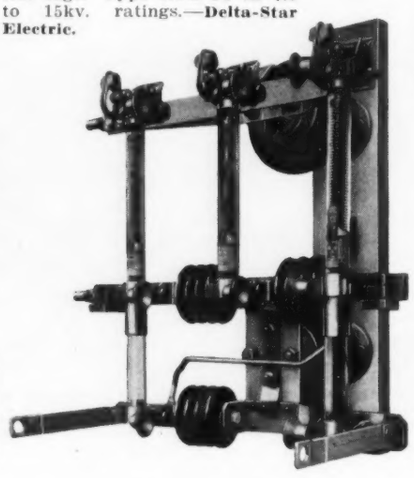


Dropout Fuse-Switches—Rupture up to 3,000 r.m.s. amperes. Spring-cushioned upper-contact arm and fuse-holder recoil. Ratings—5 to 46 kv.—**W. N. Matthews.**



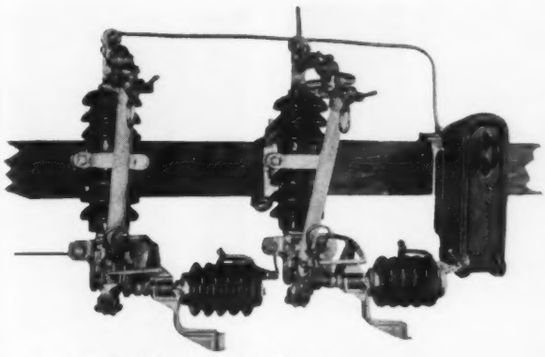
Recloser Cutout—Three "Semafor" open cutouts, simplicity of mechanism, rugged construction, interchangeable fuse tubes, hook-stick operation, delayed reclosure.—**Schweitzer & Conrad.**

Automatic Reclosing Fuse — "Loadgard." Ratings 5 to 200 amp., 2,300 volts to 69,000 volts. Reliability, no external moving parts, for co-ordination with breaker relays and with secondary fuses; inspection and fuse replacement without interruption to service. —**Schweitzer & Conrad.**



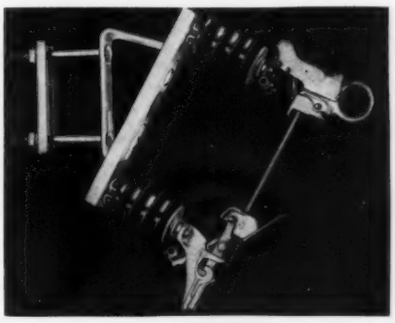
Drop-Out Cutout—Single insulator, adjustable swivel hanger, sleet protection, lifting lug on cartridge, easy fuse removal. Available for 5,000, 7,500/12,500 and 15,000-volt service, in ratings of 60 and 100 amp. — **Line Material.**

NEW DISCONNECTS, FUSED SWITCHES, CUTOUTS



Tranfer Switch—For attachment to drop-out "Fuswitch." When latter clears circuit current is transferred to another Fuswitch or cutout. Reduces cost of automatic restoration.—**W. N. Matthews.**

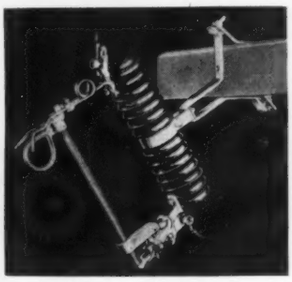
Drop-Out Expulsion-Fuse Cutout — For overload protection of moderate capacity circuits without sacrificing effectiveness of short-circuit fusing. For 7,500 and 15,000 volts, in ratings of 60 and 100 amps.—**Line Material.**

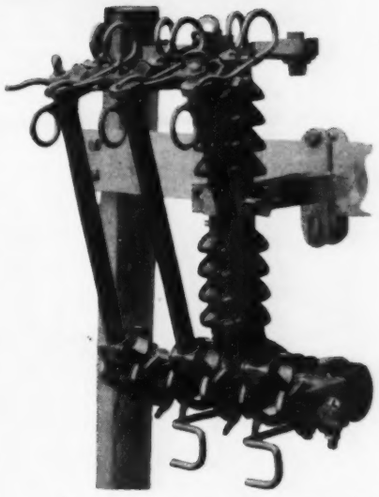


PRIMARY SWITCHES

Multiple-reclosure fused switches, indicating cutouts and improved disconnects. Various methods of effecting automatic reclosures. Adjustable time delays. Minimization of insulators. Interchangeable fuses. High-pressure, spot and line contacts. Transfer switches. Interchangeable horns. Tilting and rotating-insulator disconnects. Counterbalanced units. Interlocked disconnect and ground switches. Solderless lugs and clamp terminals. Integral current transformers. Porcelain-inclosed disconnects. Indicating disconnects.

Trip-Out Fuse Switch—Contacts bolted to porcelain, fog-type insulators insure sturdiness, high flashover and minimum leakage. —**Kearney.**





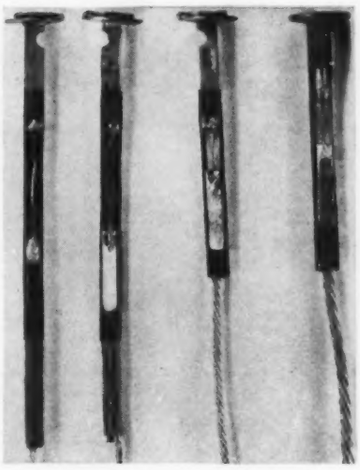
Single-Support 3-Shot Cutout — Opening of one unit connects adjacent cutout. Type RKOT—50 or 100 amp. at 15,000 volts. Use any universal tension-type fuse link. Fuse tubes interchangeable between single-shot and repeaters. Positive drop-out. Non-repeating and 2-shot type also available.—**Railway & Industrial.**

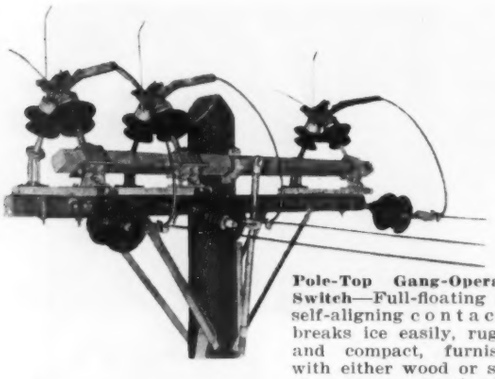
Universal Fuse Link—No change in operation from oxidation, corrosion, flow of metal. Strain wire takes strain, fuse element protected by fiber housing.—**Schweitzer & Conrad.**

Unifit Fuse Links – Fit all standard makes and sizes of cutouts. Strain and spring type with single and double top leader. Various-size contact buttons; can be removed. — **Line Material.**

Fuse Links for All Cutouts—"Fitalls" up to 15 kv. are interchangeable; spring fiber tube assures positive separation on blowing.—**Kearney.**

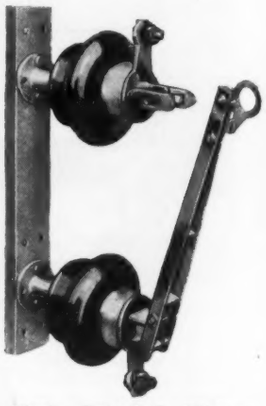
Universal Fuse Links — Low-temperature tension-type. For all distribution cutouts (open or inclosed, standard or drop-out) up to 15 kv.—**Westinghouse.**



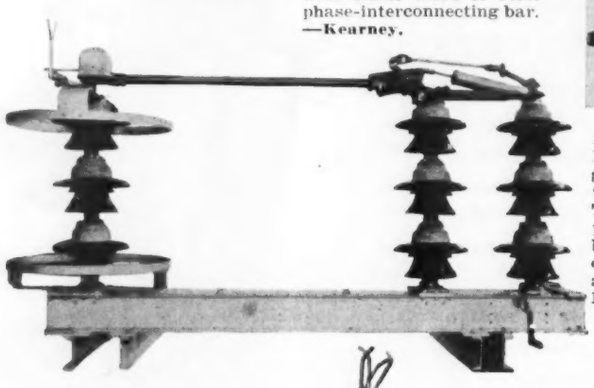


Pole-Top Gang-Operated Switch—Full-floating and self-aligning contacts, breaks ice easily, rugged and compact, furnished with either wood or steel phase-interconnecting bar. —**Kearney.**

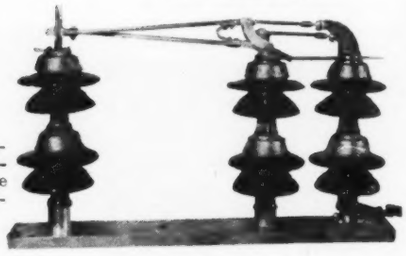
Vertical Break Horn Gap Switch—Rotating insulator, operating mechanism enclosed, single adjustment for wear of monel ball bearings. Up to 220 kv.—**Hi-Voltage Equipment.**



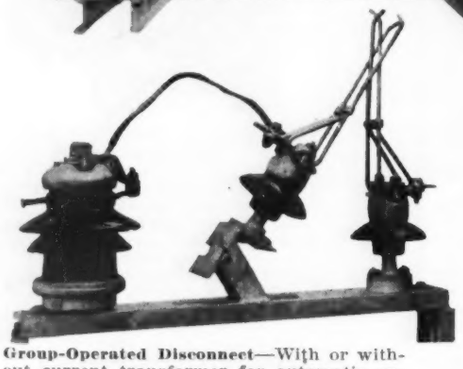
Hook Operated Disconnect Switch—Line pressure contacts have conductivity guaranteeing positive low temperature connection. Solderless "Connectites" for line wires.—**Kearney.**



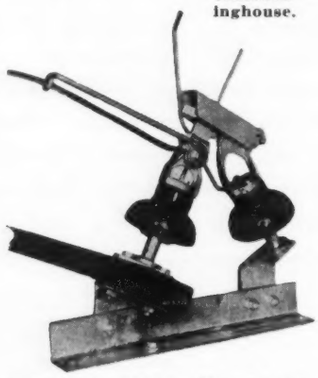
Air-Break Switch—High-pressure, gang-operated, 115 to 287 kv. Type TXG-1, release of pressure before blade travels, efficient counterbalance mechanism.—**Pacific Electric.**



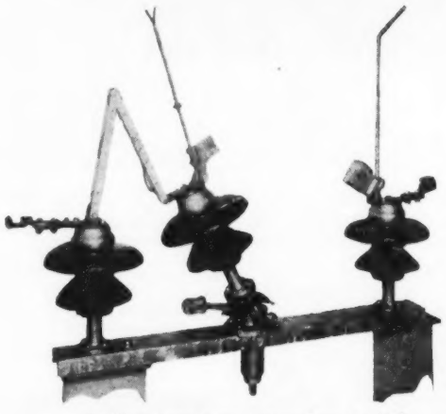
High-Voltage Disconnect Switch—Has high-pressure contacts. — **Westinghouse.**



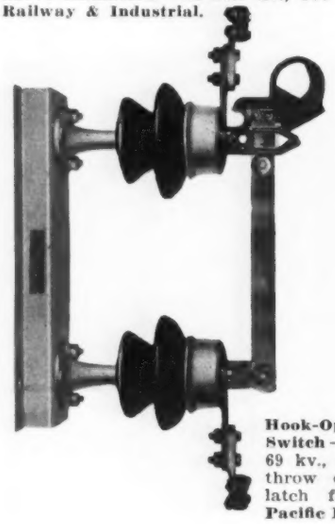
Group-Operated Disconnect—With or without current transformer for automatic operation. Clamp terminals. Small number of parts. Horns interchangeable. High-pressure spot contact. Non-ferrous parts above insulators. 7.5-34.5 kv., 200 amp.—**Railway & Industrial.**



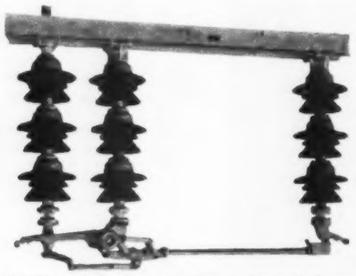
Rural-Line Switch—For 7.5 to 23-kv., 20-amp. circuits. Ice breaking, full-floating multi-finger contacts.—**Delta-Star.**



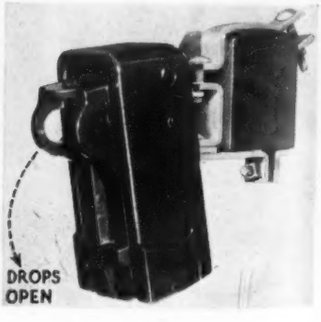
Tilting Insulator Horn-Gap Switch—Operating shaft rotates, shipped fully assembled for minimum installation cost, up to and including 69 kv.—**Hi-Voltage Equipment.**



Hook-Operated Disconnect Switch — Single-pole, 7.5 to 69 kv., single-throw, double-throw or transfer, pry-off latch facilitates opening **Pacific Electric.**



115-Kv. Disconnect—For inverted mounting. Copper-tube blade; self-aligning contacts with sleet shields. Ball bearings.—**Delta-Star.**

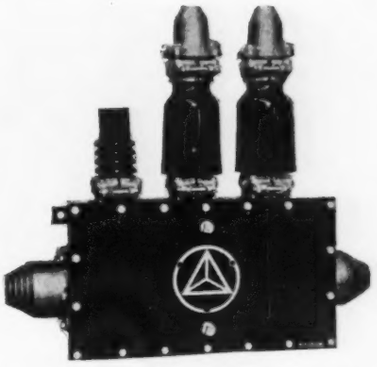


Drop-Out Box Cutout — When fuse blows door automatically drops open and is dead. Compression spring for positive release.—**Schweitzer & Conrad.**

NEW DISCONNECTS, FUSED SWITCHES, CUTOUTS

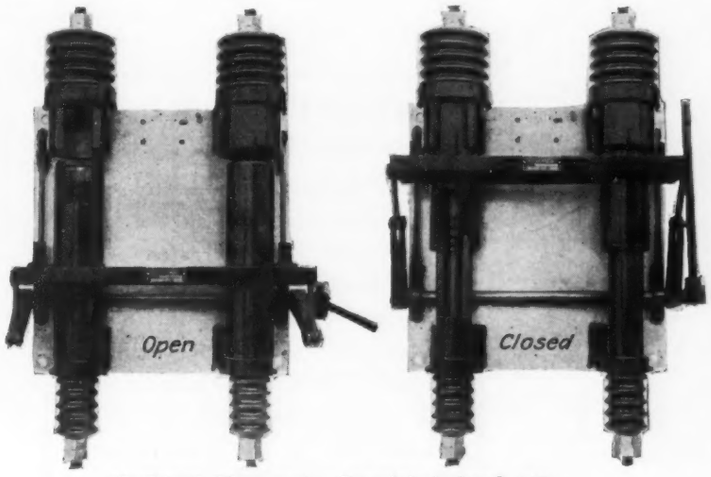
2-in-1 Inclosed-Type Fuse Cutout—Contains both a drop-out and an indicating device—for 60 amp., 5,000- and 7,500/12,500-volt grounded Y ratings. The change from indicating to drop-out feature accomplished by removal of small spring wire yoke.—**General Electric.**

Inclosed Cutout—Clamp terminals. Interchangeable universal tension type fuses. High-pressure spot contacts. Positive drop-out. Non-ferrous current-carrying parts. Single and 2-shot repeaters.—**Railway & Industrial.**

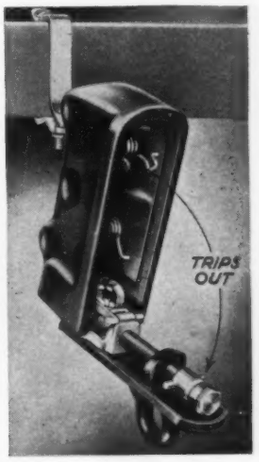


Disconnecting Tap Box—For cable splice and branch tap. Disconnecting caps available for complete submersion.—**Delta-Star.**

Drop-Out Fuse Cutout—Circuit interruption causes fuse cartridge to drop into telltale position. Large air gap between the upper contact and door. Ratings—5,000 volt, 60 amp. and 7,500/12,000, 60 amp.—**Line Material.**



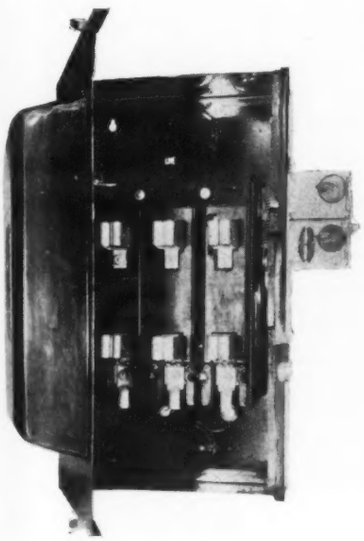
"Isolator" Disconnect—Porcelain-inclosed contact mechanism. Telescoping isolator. Open position shown by visible gap. Cut-away sections show mechanism. Adapted to gang, remote motor or solenoid operation. For standard, cable end-bell, type H breaker or high-voltage indoor service. Latter up to 50 kv., not porcelain inclosed. Others rated up to 25 kv.—**Electrical Engineers Equipment.**

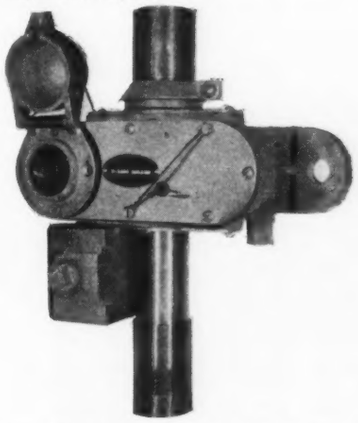


Tripomatic Cutout—Cementless, clamp connection for live wires, re-fusable without use of tools. Spring contact pressure not transmitted to fuse link.—**Kearney.**

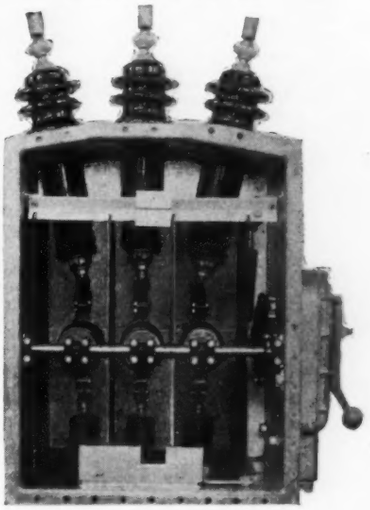
Interlock for Inclosed Safety Switch—Two keys in tandem to lock switch in open position. Four such units can be put in tandem.—**Cory.**

Disconnect-Ground Switch—For primary side of substation transformers. Oil-filled, three-position unit, 15 kv. Electrical interlock.—**Delta-Star.**

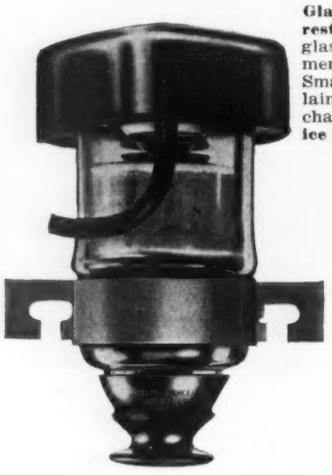




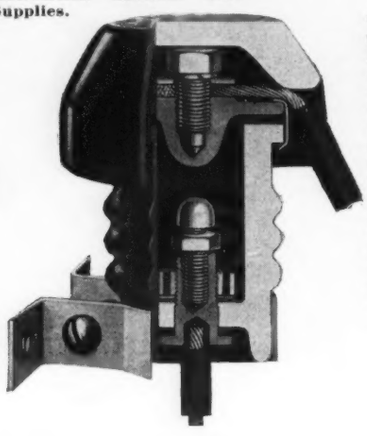
Heavy-Duty Disconnect Switch Interlock—Plunger type contact maker prevents operation of switch when key is removed. Rugged, 250 volts.—**Cory.**



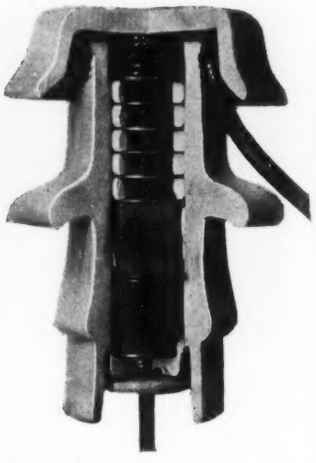
NEW DEVELOPMENTS IN LIGHTNING ARRESTERS



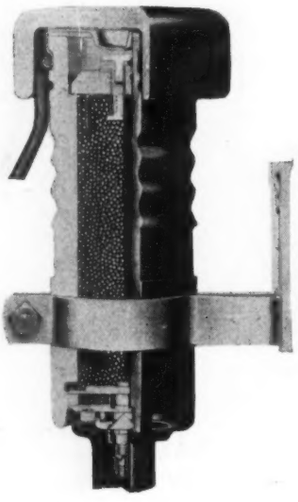
Glass-Body Crystal-Valve Arrester — Inclosed in Crystex glass revealing internal elements. Hermetically sealed. Smaller and lighter than porcelain types, but same electrical characteristics.—**Electric Service Supplies.**



Transformer Protective Gap — Rugged; positive moisture seal; small space; flexible mounting. With and without porcelain cap. For mounting on crossarm, transformer tank, hanger irons, secondary neutral stud or line conductors. Sparkover at 6,000, 11,000 or 15,000 r.m.s. volts. —**Line Material.**



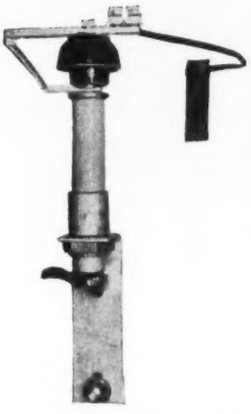
Autovalve Lightning Arresters—For distribution transformers up to 73 kv.; approximately 2½ times cut-off rating for surge currents to 1,500 amp.; above that has slightly rising characteristic for crest voltage. From 3 to 15 kv., guaranteed discharge capacity of 50,000 amp. — **Westinghouse.**



Line-Type Pellet Lightning Arrester—From 1 to 15 kv., with external corrugated porcelain containers, adjustable hangers, sealed gap, and clamp-type ground terminals. — **General Electric.**

ARRESTERS MORE EFFECTIVE

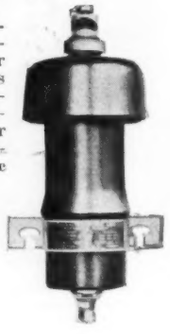
Higher discharge capacities with rising characteristics in the crest region are new arrester steps which tend to hold surge voltage to definite levels, while also averting destruction. New forms of inclosure facilitate external-internal inspection and promote longer life. In the lower voltage brackets gaps have come into vogue to accord transformer protection and to isolate grounded neutral from arrester ground. Flexibility in mounting features gives single designs the chance to mount near or on the protected equipment as desired.



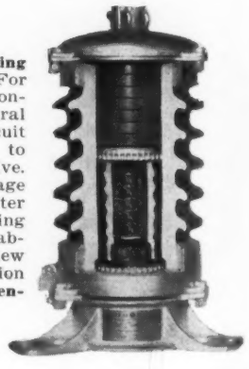
Lightning Protector for Distribution Transformers—For existing transformers of all makes in which insulation is higher than characteristics of protector. Supplement line-type arresters. — **Westinghouse.**

Protective Gap — Wide application in interconnection and balanced protection. Type G3 principally for connection to primary phase wires as isolating gap between arrester ground and grounded secondary neutral. Various mounts. — **Electric Service Supplies.**

Pyrex-Housed Arrester—Permits inspection for common causes of trouble. Crossarm or flat-mount hanger. Ratings—1,000, 3,000 and 6,000 volt. — **Line Material.**

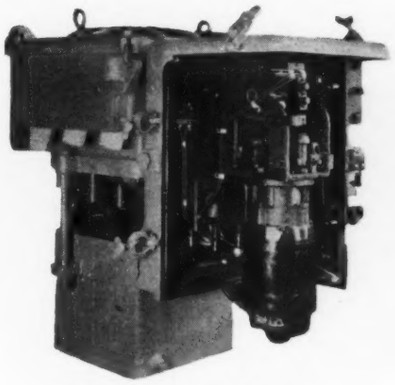


Stud-Terminal Arresters—Stud terminals for line or ground connections or both. Watertight; easy to install. Bakelite cover for ground terminal. — **Electric Service Supplies.**

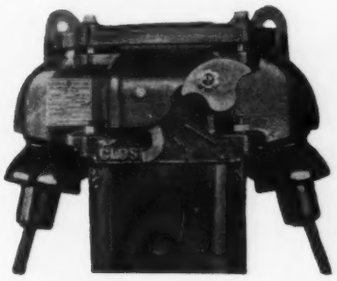


Thyrite Lightning Arrester — For grounded and non-grounded neutral service for circuit voltages of 2.3 to 287 kv. inclusive. Hold surge voltage to twice arrester rating, representing a gain and establishing a new standard in station protection. — **General Electric.**

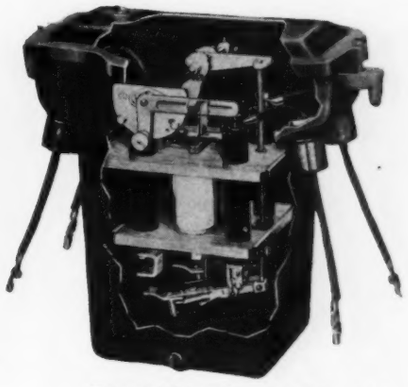
NEW DEVELOPMENTS IN OIL CIRCUIT BREAKERS



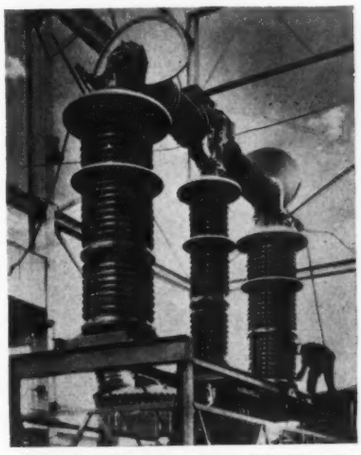
7.5-Kv. Pole-Line Breaker — Also for frame mount. Type P-50 rated 25,000 kva.—**Condit.**



Oil Circuit Recloser—For the improvement of service on rural lines where faults are transient and use of oil circuit breakers not economically justified. Rated at 50 amp., 7,500 volts, interrupting rating 1,200 amp. Normal duty cycle three reclosures. After the third reclosure device opens and locks open.—**General Electric.**



Remote-Control 7.5-Kv. Oil Breaker—Either series or shunt operating coils; double solenoids. Auxiliary hand control. More rugged and increased insulation. Heavier contacts and flexible shunt. Minimum flashover above oil, 1.5 in.—**South Bend Current Controller.**

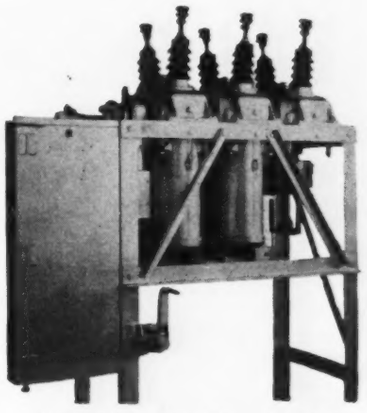


287½-Kv. Impulse Type Oil Circuit Breaker — For Boulder Dam-Los Angeles transmission line. Interrupting rating of 2,500,000 kva., opening time of 3 cycles, from energizing the trip coil to the interruption of the circuit. Single pole unit shown.—**General Electric.**

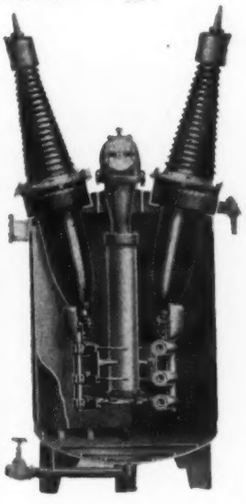
Expulsion Oil Circuit Breaker—Horizontal multi-break principle, with expulsion contacts added, low tank pressures, no oil thrown, decreased carbonization, reduced maintenance 15 to 230 kv.—**Pacific Electric.**

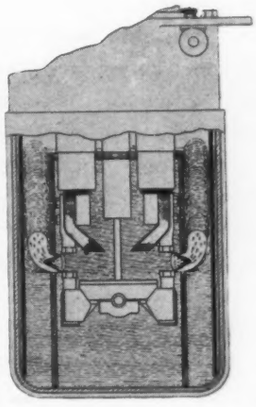
BREAKERS AID CONTINUITY

Two years' progress on oil circuit breakers embraces high speed and sharper cutoff out of the intensive development of such means for quenching as expulsion, multi-breaks, turbulence and impulse action. This will promote stability and service continuity on interconnected or isolated systems. Oil throwing and carbonization are less a hazard. Meanwhile, these developments have trickled into the lower voltage ranges for distribution and industrial service. The recloser assumes rising importance for both services. Remote control has made advances.

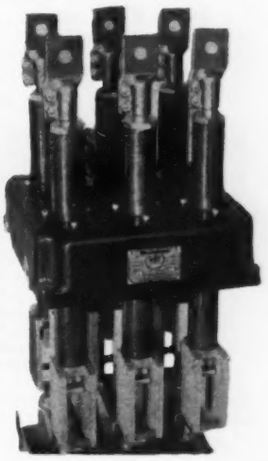


Moderate Capacity Outdoor Breakers—Eight-cycle service. Rated 175,000 kva. at 15 kv.; 150,000 kva. at 23 kv. Pole or frame mount. Manual or electric operation. "Ruptor" arc quenchers. Type OZ-12. — **Condit.**

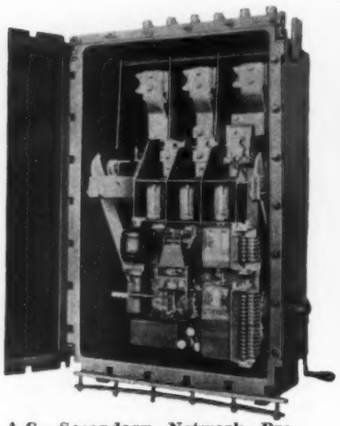




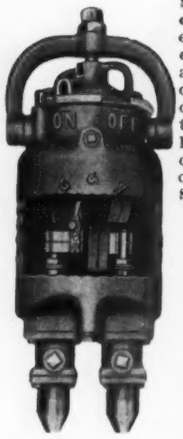
Expulsion Port Breaker — Arc-formed gas rushing through port causes turbulence in arc stream, preventing maintenance of arc through zero point. Boulder Dam. Three-pole, three-tank breaker rated 4,000 amp., 23,000 volts; 2,500,000 kva. at 16,500 volts. — **Allis-Chalmers.**



Indoor Oil Circuit Breakers—With Deion interrupter, 25,000 kva. interrupting capacity, manually and electrically operated, non-automatic and automatic, single and double throw 600 amp., 7,500 volts; 800 amp., 2,500 volts. — **Westinghouse.**



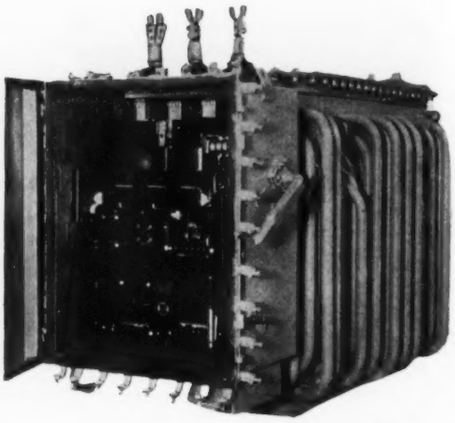
A.C. Secondary Network Protector — With motor-operated, gear-driven, cam-type mechanism, induction-cylinder network and phasing relays. Each phase completely isolated. — **General Electric.**



Subway Oil-Fuse Cutout — For use where exposed to corrosive or explosive fumes, salt air and inflammable dust. Closed expansion chamber. Unit, detachable, sealed potheads. Larger size clears 25,000 kva. in ¼ cycle.—**G & W Electric Specialty.**

Secondary Network Cable — Non-deteriorating insulation wholly inorganic, no toxic, inflammable or explosive gases or smoke. —**Rockbestos.**

Plastic Seal for Duct Openings — J-M Duxseal. Permanently plastic, non-slumping. Insoluble and unaffected by gases or condensates. Salvageable. — **Johns-Manville.**

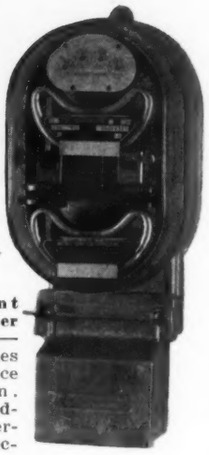


Compact Network Protector—Non-inflammable cooling and insulating liquid, reduced size, transformer connected to busses on rear, outgoing cables at top.—**Westinghouse.**

Transite Conduit—Strong, dense, smooth bore, rot-proof, corrosion resisting, nonmetallic, non-magnetic, incombustible, light in weight. Possible to omit concrete envelope. —**Johns-Manville.**

Parkway Cable—Flexible, light, seamless tough rubber covering with interlocked armor. Finish and outer layers of "Sealtite" after 250 hours in oxygen bomb at 70 deg. C. and 300 lb. pressure, are not appreciably deteriorated.—**Providence Insulated Wire.**

Vacuum Process Lead Cable Sheath—Lead extruded under vacuum minimizes oxidation, impurities, gas inclusions, lubricant inclusions, circumferential laminations.—**General Cable.**



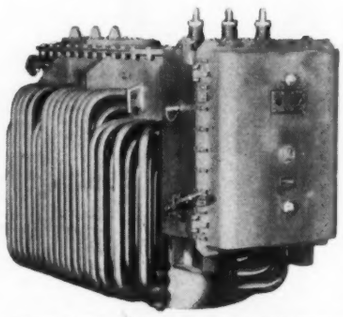
Two-Element Network Meter With Pull Box—Accommodates new sequence connection. "Micro-set" adjustments. Interchangeable electromagnets. Potential indicators.—**Duncan.**

Stranded Conductors Compacted—Round and sector forms, conserves space and weight, increased current carrying capacity, smooth configuration.—**General Cable.**

7,500 - Volt Subway Switches. — Either single or multi-conductor cable sleeves of cone shape. Single or double throw. Automatic or non-automatic.—**Condit.**

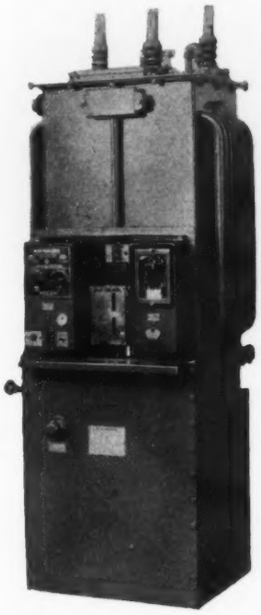
UNDERGROUND

Compactness, resistance to submersion, avoidance of explosions and simplified construction are some characteristic features. Subway network transformers with non-inflammable cooling medium. Switches and cutouts resistant to corrosive fumes. Reduced-size network protectors. Quick-clearing, non-inflammable network cable. Vacuum-processed cable sheaths without imperfections. Compacted-strand cable with smooth configuration. Rubber parkway cable protected against deterioration. Ducts requiring no concrete envelopes.

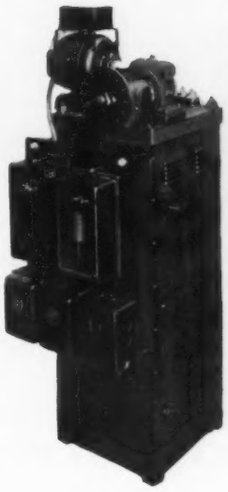


Secondary Network Subway Transformer—Filled with Pyranol, the new non-flammable insulating and cooling medium. Much-reduced dimensions.—**General Electric.**

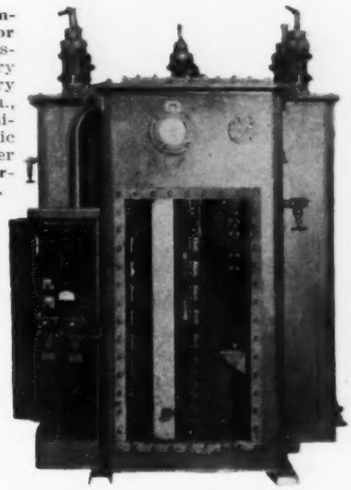
NEW DEVELOPMENTS IN VOLTAGE REGULATORS



Step Regulator — For feeder regulation at lower cost, higher efficiency, higher impulse strength and less noise. Single and three phase; 2,400 volts and higher. Plus and minus 10 per cent range in 32 steps. — **Allis-Chalmers.**



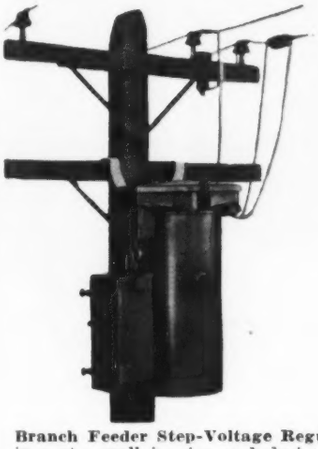
Transformer-Commutator Regulator — Tapped transformer, stationary commutator, rotary brush, ¼ to 500 kva., up to 2.4 kv., semi- or full-automatic and manual, 1 per cent steps.—**American Transformer.**



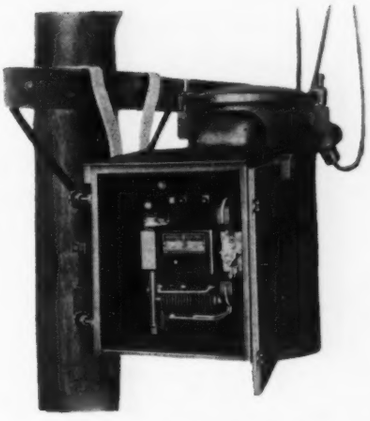
Step-Voltage Regulator — 150-kva. model shown has range of 10 per cent in 17 steps.—**Westinghouse.**

REGULATORS

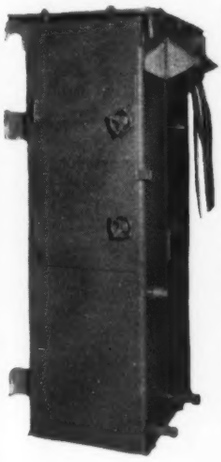
Shall it be bus, substation or pole-line regulation, more copper, closer transformers or combinations thereof? Here are some improved regulators: Less expensive pole-mounted regulators. Step-regulated or induction type with higher impulse strengths. Voltage boosters for intermittent range loads separated by current or voltage. Rotary-brush type tap changers.



Branch Feeder Step-Voltage Regulator—Low in cost, small in size and designed for pole mounting. Because of its flexibility, particularly applicable to circuits which may require a combination of boost and lower and for which smooth regulation of more costly induction regulator cannot be economically justified.—**General Electric.**



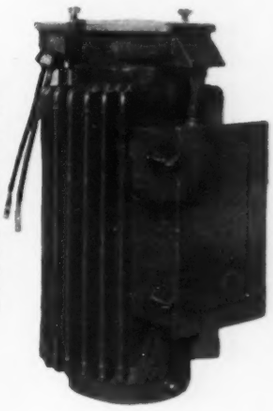
Branch Feeder Step-Voltage Booster — Suitable for boosting voltage during lighting peaks and intermittent cooking loads, and is applicable in fringe areas where the load does not warrant the installation of more expensive regulating equipment.—**General Electric.**



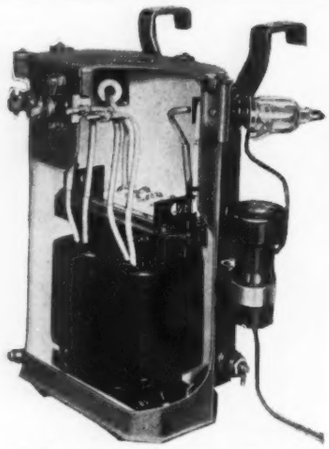
Voltage Booster — Pole-mounted, 5 to 10 per cent boost (or buck if desired). Rural or isolated load. From 1½ kva. at 2,400 volts to 50 kva. at 6,900. Actuated either by line current or line voltage. Single-step or two-step. Type BR.—**Westinghouse.**

Branch Feeder Regulator — Single and three phase, 2,400 to 11,500 volts. Ten per cent range in eight steps. —**Allis-Chalmers.**

Branch Feeder Induction Voltage Regulator — Provides efficient and automatic voltage regulation of branch feeders and rural lines within limits ranging from 10 per cent boost to 10 per cent lower, at low capital investment.—**General Electric.**



NEW DEVELOPMENTS IN TRANSFORMERS



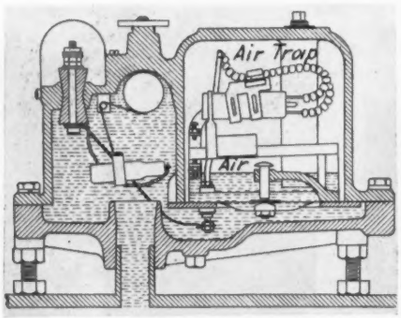
Surge-Proof Transformers — Type CB —Solderless connectors on both primary and secondary terminals, gauged porcelain bushing on secondary outlet. Type SB—Externally mounted surge diverters and grounding gaps.—**Allis-Chalmers.**

Low-Loss Transformers — Low core and copper losses. For 1½ kva. to 200 kva., single phase, at 480 volts to 13,800 volts.—**Line Material.**

Distribution Transformer—1½ to 100 kva., single phase, shipped filled, co-ordinated bushing easily replaced without soldering, no syphoning, wrench only tool required.—**American Transformer.**

Flicker Reducer—Auto-transformer ends of distribution lines. Air-cooled, single phase, 1 kva., 240/120 volts.—**Allis-Chalmers.**

Distribution Transformer — Valve-type arresters. Clamp-terminal bushings.—**General Electric.**

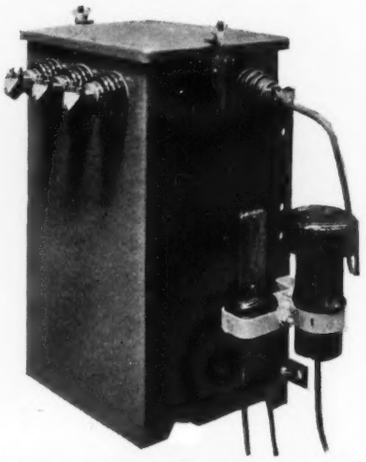


Transformer Protector — Operates at incipience of faults. Dependent on gas-pressure wave or accumulation of gas from decomposition of oil or insulation.—**Walter Kidde.**

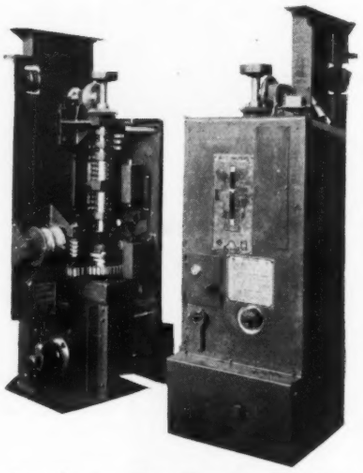
TRANSFORMERS

Transformer improvements have been chiefly to minimize breakdowns, change loss ratios, reduce the cost of rural and light-load installations, facilitate interconnection of neutrals and ground, and simplify mounting. Various surge-protected units with co-ordinated gaps and bushings, stud-type bushings, valve arresters, surge diverters and grounding gaps. Single primary bushing for single-phase, solid-ground neutrals service. Ganged secondary bushings and clamp terminals. Auto-transformer flicker reducers. Low-loss units.

Rural Type Transformer—Reduced mounting costs, one high-voltage bushing, solidly grounded neutral, self-protecting, no hangers, shipped filled.—**Moloney.**



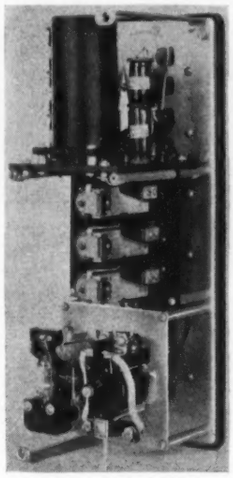
Surge-Protected Transformers — Have arresters and co-ordinated gaps and bushings. Stud or lead type. Single phase, 2,400 and 4,800 volts.—**Wagner.**



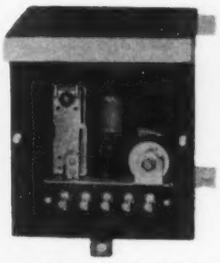
Transformer Tap-Changer—For large power transformers. Motor-operated hoist. Dead-front panel.—**Allis-Chalmers.**

Line Transformers — Reduce installation and maintenance cost. High-voltage co-ordinating gap. Neutrals interconnected inside case. Shipped with oil. Sizes 1-3 kva., 2,400-7,620 volts. For solid-ground neutral.—**Wagner.**

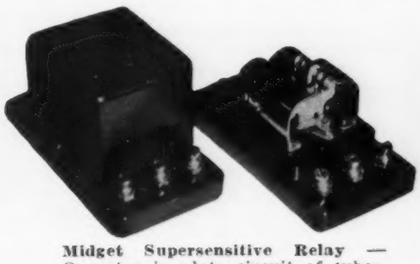
NEW DEVELOPMENTS IN RELAYS



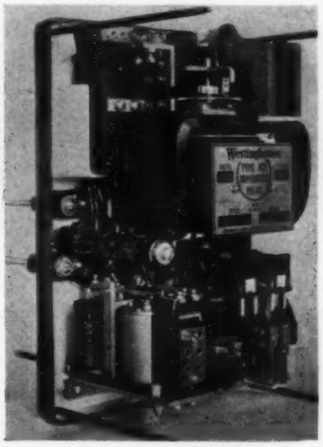
Automatic Synchronizing Relay—"Advance transformer" fed from a copper-oxide rectifier. Either automatic or manual stations.—**General Electric.**



Outdoor Photoelectric Relay—Lens and diaphragm admit light to self-contained phototube. Metal visor minimizes effect of slanting run rays. Rated 1 amp. at 110 volts a.c. non-inductive load. Power consumption about 5 watts. — **General Electric.**

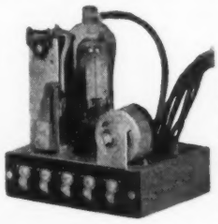


Midget Supersensitive Relay — Operates in plate circuit of tubes, with thermo-regulators, etc. Operating current 0.007 amp., 6 volt; contacts, 1 amp. at 115 v., a.c. — **American Instrument.**



Protective HCZ Relay — High-speed impedance element gives 1-cycle protection for 4/5 the line. Secondary impedance element provides ½ to ¾—second protection for remainder. Two targets show relative fault position. —**Westinghouse.**

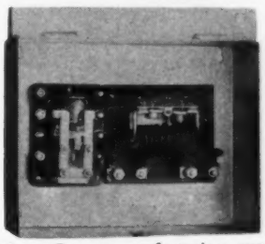
Sensitrol Relay — Small, permanent magnet for stationary contact. Iron rider on pointer is movable contact. Functions on as low as 2½ microamperes; 5 watts capacity.—**Weston.**



Midget Photoelectric Relay—Opens or closes control circuit when light beam is interrupted. Rated ½ amp. at 115 volts d.c., non-inductive load. — **General Electric.**

RELAYS

Relays have been developed for practically every use. Co-ordinated application to the various combinations of circuits and fault possibilities is more the problem than to find new instruments. But here are some new or improved devices of the past two years to be added to the previously available types. Carrier-current units. High-speed impedance relays for one cycle protection. Primary relays handling up to 1 kw. Indoor and outdoor photo-electric relays.



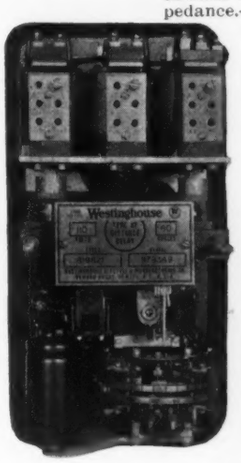
Motor Relay—Increase of series current opens solenoid valve.—**Struthers Dunn.**

Power Relay — For use with sensitive primary relays. Handles 4 circuits up to 1 kw. each. For direct control of industrial circuits. Model 630. —**Weston.**

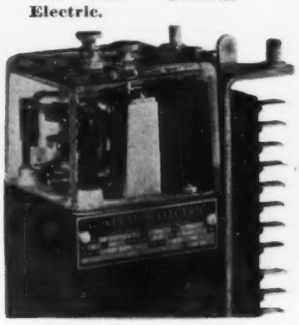
High-Speed Impedance HY Relay—For rapid clearing of faults on shorter line sections where arc resistance of short circuits may be comparable to line impedance.—**Westinghouse.**

Carrier-Current Relay — Panel with requisite relays, corresponding receiving equipment available. — **Westinghouse.**

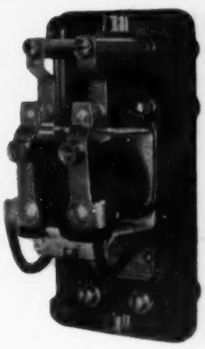
Auxiliary Relay — Two independent contact circuits, circuit-closing or circuit-opening. 24 to 550 watts with d.c. interrupting rating 12 to 0.25 amp., a.c. 20 to 3 amp. — **Westinghouse.**



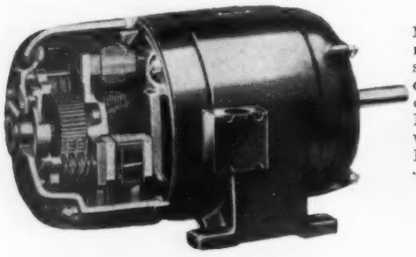
Three-phase Network Relay — Induction-cylinder gives about 50% more torque. Greatly reduced burden, space requirement, temperature rise. — **General Electric.**



Supersensitive Mercury Relay—For thermo-regulators and other delicate-contact devices. Readily changed from normally open to normally closed. Operating current, 0.007 amp., 6 volt, d.c. — **American Instrument Co.**

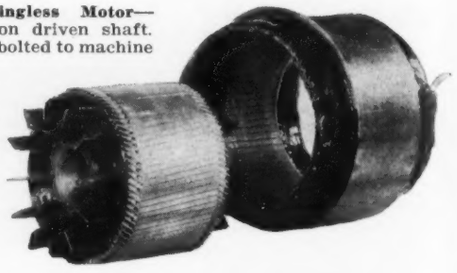


NEW DEVELOPMENTS IN ELECTRICAL MOTORS

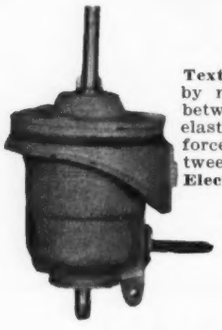


Motor With Integral Magnetic Brake—Alternately spaced steel and fiber discs, splined to shaft and end cover respectively. Magnets release brake when motor is energized. Hold load at a standstill. —**Master.**

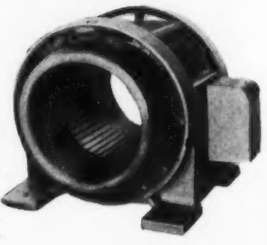
Compact Bearingless Motor—Rotor mounts on driven shaft. Stator housing bolted to machine frame or supported on integral feet. Facilities for aligning. Various starting torques and slips. — **Louis Allis.**



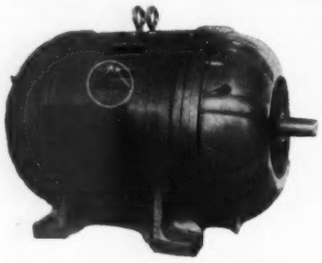
Multi-Speed Gear Motor—Eight speeds obtainable from combination of 4-speed motor and 2-speed gear. Also available in 2, 4 and 6-speed units. Helical-gear reduction changed by lever on top.—**Century.**



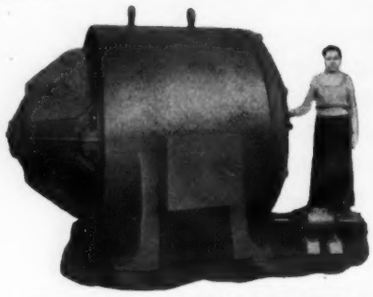
Textile Bobbin Motor—Supported by metal mounting band clamped between two rubber rings. Correct elasticity in support reduces bearing forces, removes critical speeds between 4,000-10,000 r.p.m.—**General Electric.**



Motor With Sealed Stator Coils—Bakelite shields over stator coils. Excludes metallic dust, oil, moisture, mild acids, etc. "Seal-clad" ratings up to 25 hp., 1,800 r.p.m. Silver-brazed, indestructible rotors. — **Allis-Chalmers.**



Dual Ventilation Inclosed Motors—Two sets of ducts, inner set with sealed air-cooled heat exchange with air in outer ducts. Suitable for hazardous locations. Save fire walls. Up to 200 hp.—**Westinghouse.**



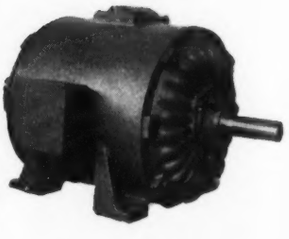
Fully Inclosed Fan-Cooled Motors—Protect against dirt and moisture. Reduce maintenance. Wide range of sizes. Largest d.c. Type T unit developed, shown, rated 100/125 hp., 300/1,200 r.p.m. for continuous steel picking.—**Reliance Electric & Engineering.**

Individual Sewing Machine Motor—Split-phase, flywheel, clutch, brake and pulley, treadle speed control.—**Diehl.**

Self-Protected Motor—Induction units ½ to 30 hp. Built-in protectors shut off power with excessive temperature. Require less supervision. — **Lincoln Electric.**

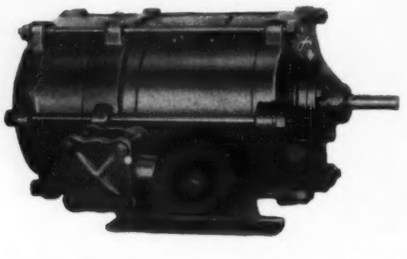
Pipe-Ventilated Motor—For unusually severe service (high temperature and abrasive, corrosive or inflammable dust). Cheaper than totally inclosed motors. Interchangeable stators.—**Ideal.**

Constant-Speed Universal Motor—Electric governor and speed reducer.—**Bodine.**

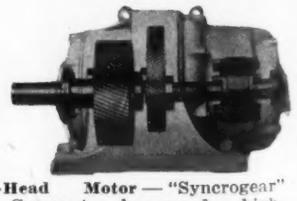


Water-Cooled Induction Motor — For use in high ambient temperatures as around coilers in continuous hot-strip mills. Watertight, squirrel-cage unit. Rating same as for open frame of same size. — **Reliance.**

Self-Contained Capacitor Motors—Ring-shaped dry electrolytic condenser in end bell. Centrifugal cut-out switch. Indestructible rotor. —**Louis Allis.**

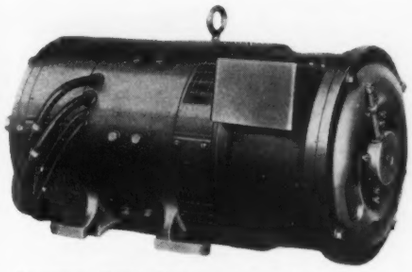


Inclosed Fan-Cooled Motor—Fully protected, dust-tight, for mills, foundries, packing plants, chemical plants, etc.; 1 to 200 hp.—**Ideal.**

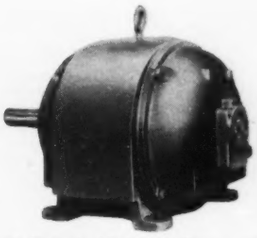


Geared-Head Motor — "Syncrogear" unit. Compact, low-speed, high-capacity.—**U. S. Electrical Manufacturing.**

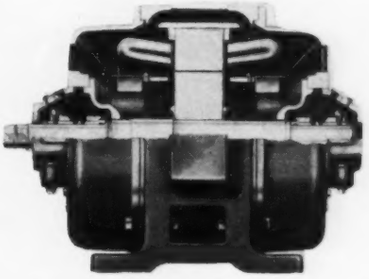
NEW DEVELOPMENTS IN ELECTRICAL MOTORS



Compact Dual Motor—For railway car air conditioning. D.C. motor has low starting current; operates on considerable voltage range from coach circuit. Three phase a.c. motor connected to commercial voltage.—**Century.**



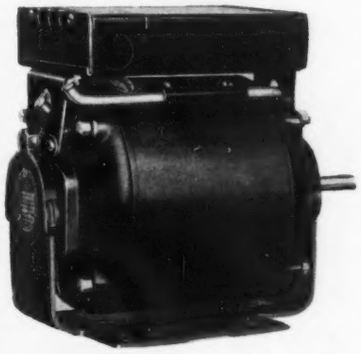
Splash-Proof Motors—Case and conduit box of cast-iron highly resistant to acid or fume corrosion. Drip-proof, weatherproof, indoor or outdoor, either squirrel cage or wound rotor.—**Westinghouse.**



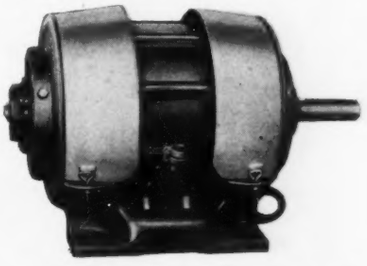
Convertible Motor—Standard parts interchangeable for open type, fan-cooled, splashproof, or totally inclosed service applications, single or multi-speed squirrel cage or slip ring types, ½ to 125 hp.—**Harnischfeger.**

MOTORS

Application of motive power to driven machinery greatly simplified. Equipment for all types of surroundings. Maintenance greatly reduced. Compact combinations give wide range of speed reduction, adjustable in some cases. "Bearingless" motors. Pipe ventilation, water cooling and dual ventilation solve some hitherto baffling motor problems. Splash-, moisture-, drip-, explosion- and dust-proof motors indicate wide adaptability. Sealed stator coils, indestructible rotors minimize maintenance. Resilient supports, integral capacitors and governor-controlled universal motors.

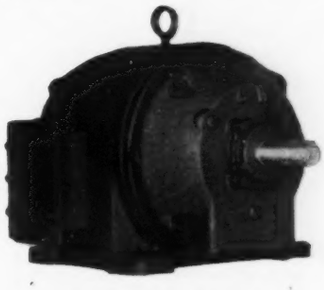


Capacitor Motor—For refrigeration, oil burners, etc., resilient mounting unaffected by conduit connection.—**Emerson.**



"Quick-Clean Motors"—For places where dust and lint abound. "Seal-Clad" shields on stator windings. Removable covers facilitate inspection. Cartridge-mounted ball bearings. Ratings 5-15 hp.—**Allis-Chalmers.**

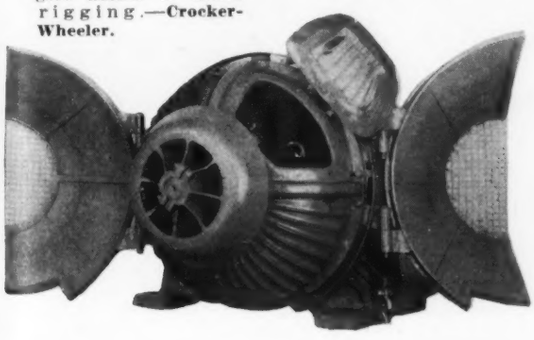
Fractional Horsepower Gear Motor—Speeds below those economically obtainable directly from a motor. Line includes concentric-shaft-type planetary reductions, right-angle worm and right-angle combination worm-planetary reductions.—**General Electric.**



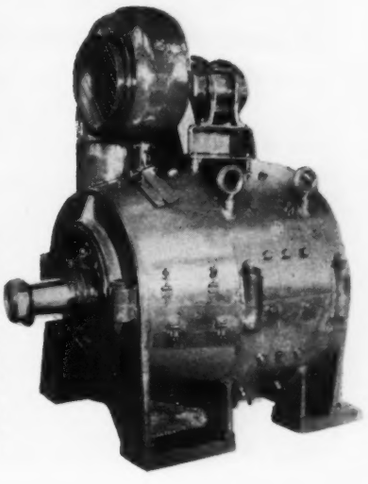
Splash-Proof Induction Motor—Polyphase, in sizes up to 30 hp.—**Crocker-Wheeler.**

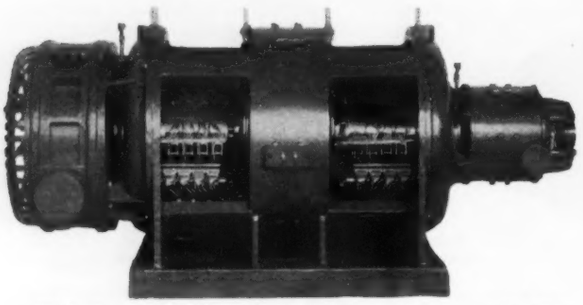
Totally-Inclosed Fan-Cooled Motors—Squirrel cage, for service in dusty, fumy or moist atmosphere. Rugged, 55° C.—**Diehl.**

Totally Inclosed D.C Motor—Fan-cooled, shroud, covers open to give access to brush rigging.—**Crocker-Wheeler.**



Shovel-Hoist Motor With Blower—For large power shovels. Specially developed to have sufficient capacity for operating hoist motions without use of counterweights. Force-ventilated by self-contained induction-motor-driven blower. Rated 350 hp. (continuous 75 deg. C. rise), with 230-volt armature and fields wound for separate excitation at 72 volts.—**General Electric.**





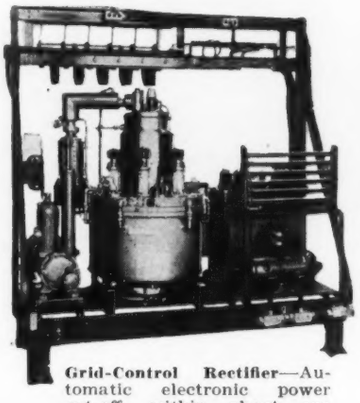
High-Current Generators—Support under each bearing. Ratings 1,000 to 4,000 amp., single or double commutator, with or without exciter and synchronous motor.—**Electric Products.**

Portable Battery Charger for Railroads—For charging 800-1,000 amp.-hr. lead-acid or nickel-alkaline batteries. Automatic reclosing switch, reverse-current protection.—**Century.**

Resilient-Mounted Belt-Tightener Motors—Belt tension varies with load. Reduces slippage, wear. Quiet operation. Capacitor or other type fractional horsepower.—**Wagner.**

FACILE PROCESS CONTROL

Forward strides are recorded in the adaptability of electrical equipment and controls to industrial production all the way from steam-shovel drives to color matching of products. In between fall sheet catchers, shakers, magnetic clutches, screw-downs for steel rolling, rectifiers for d.c. supply, high-frequency supply for high-speed tools, resilient mounting of motors and new designs of blower drives. Present control for intermittent and repetitive operations and recorders of production processes facilitate output. A new form of electric steam generator for process supply is included.



Grid-Control Rectifier—Automatic electronic power cut-off within about one cycle. Protected against overloads or backfires. Permits energy inversion. Unit rated 250 kw., 14,000 volts.—**Allis-Chalmers.**

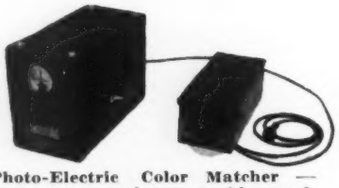
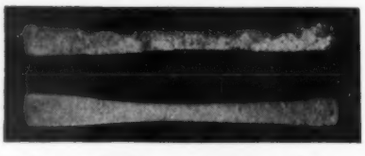
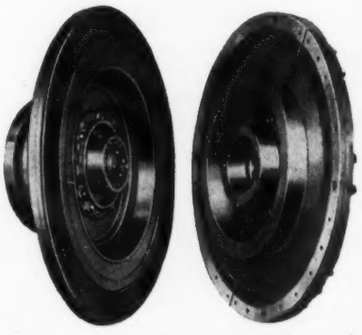


Photo-Electric Color Matcher—Compares samples as to blue, red, green components, suited for dyes, foods, paints, tiles, printing inks, etc.—**Westinghouse.**

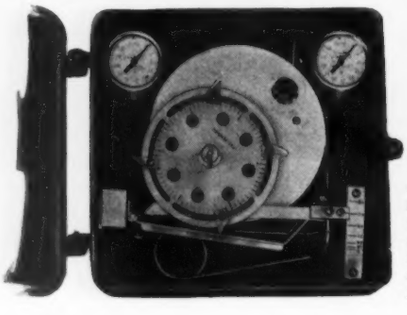


Zn-Al-Hg Anodes—Prevent sludge, anode polarization and voltage-drop increase, permitting constant setting of rheostats.—**Hanson-Van Winkle-Munning.**

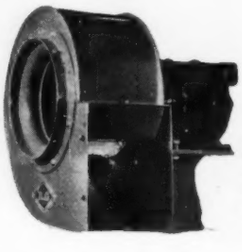


Magnetic Clutch—Alignment of friction surfaces assured. Adjusted by rotating field ring. Armature cannot score. Coils easily replaced. Gap indicator.—**Cutler-Hammer.**

Automatic Screw-Down Control—For use on steel rolling mills. Handwheel permits operator to preset equipment, while one pass is being made, for thickness of metal desired on next pass.—**General Electric.**

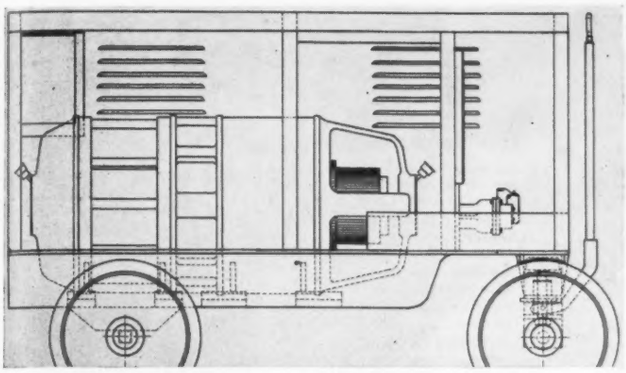


Automatic Intermittent Operation Control—For time cycles of diaphragm - operated devices. — **Taylor Instrument.**

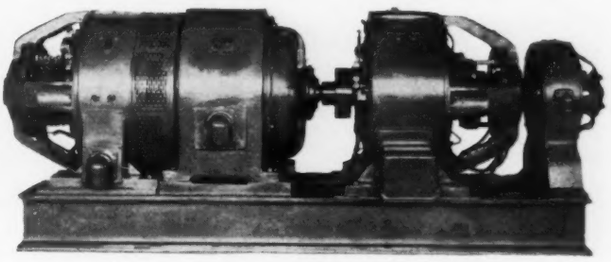


Blowers for Small - Volume Ventilation—Multi-blade wheel on motor shaft. Capacity range —1,800-2,300 c.f.m. Pressures up to 2½ in. (static). Type B.—**Ilg Electric Ventilating.**

NEW EQUIPMENT FOR INDUSTRIAL APPLICATIONS

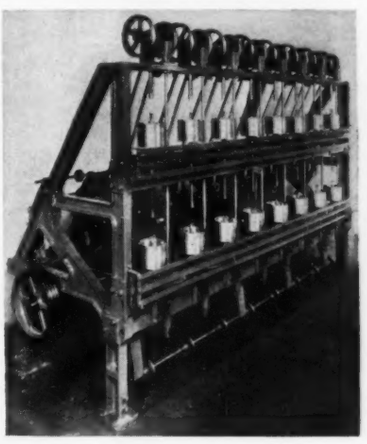


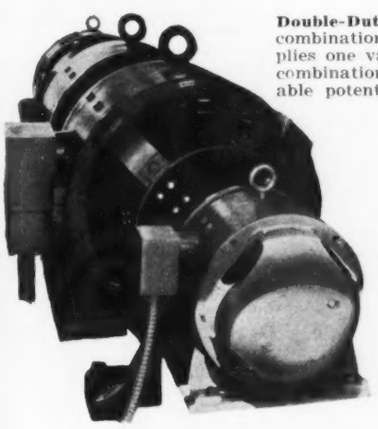
Portable Charging Set—Compact, relieves car batteries of pre-cooling and air-conditioning in terminals, or for recharging. Protected against overloads and polarity reversals.—**Electric Products.**



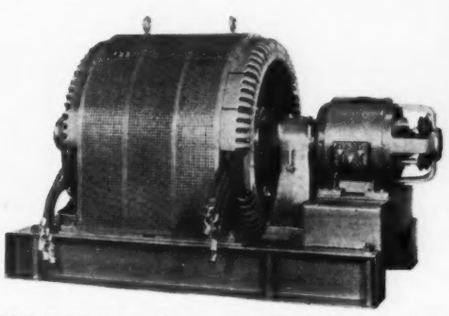
Dual-Output Generator — For variable-voltage electric shovel drives. Has two independent windings; one for swing motion, other for crowd. Saves space. Simplifies mechanical design.—**General Electric.**

Wire Insulating Machine — Completely ball bearing, operated mechanically throughout. Will handle satisfactorily cotton, fine paper, cellophane or cellulose acetate tape. —**American Insulating Machine Co.**

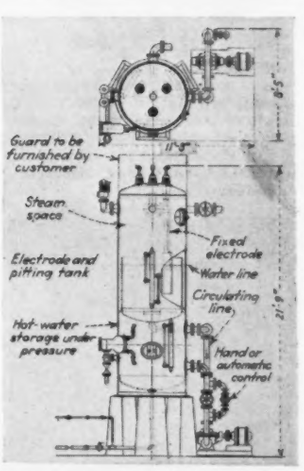


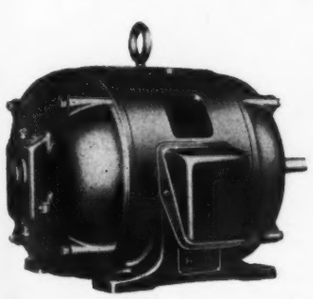


Double-Duty Shovel Generators—One combination of poles and brushes supplies one variable voltage and another combination supplies another adjustable potential.—**Westinghouse.**

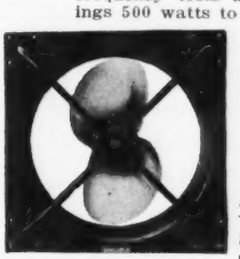


High-Frequency Power Supply—Induction frequency changers or motor-generators for high-frequency tools and induction furnaces. Ratings 500 watts to 250 kw.—**Electric Products.**





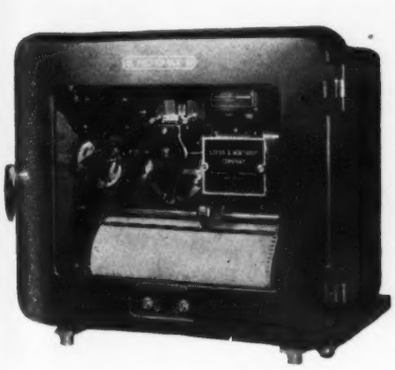
Polyphase Motor for Air Conditioning — Also for refrigeration, blowers, fans, pumps.—**Century.**



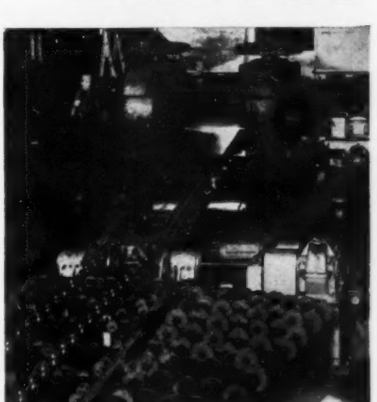
Electrode-Type Steam Generators—Three fixed electrodes in tank separate from pressure inclosure serve both as neutral and pitting plate to protect boiler shell. Water level in electrode tank determines steam output.—**Bigelow.**

Quiet Stream-Line Fans — Wide-area epicycloidal blades. Stream-lined inlet and discharge outlet. Two-speed, spring-mounted motor. — **American Blower.**

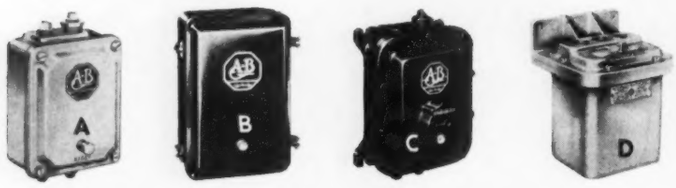
Shaker Unit — Rotary reciprocation for conveyors, screens, etc. Splash lubricated; dust-, oil- and fire-proof. — **Ajax Flexible Coupling.**



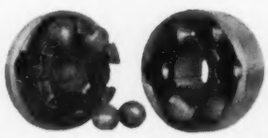
Multi-Color Recorders — Up to six colors printed on same strip chart. Avoid confusion of overlapping lines. "Micromax" multi-point recorders.—**Leeds & Northrup.**



Sheet-Catcher Control—Red-hot sheets from rolls received by conveyor-chain tilted to top rolls and reversed when sheet leaves lower rolls. Round trip three seconds. Controlled by photo-cell. —**Westinghouse.**

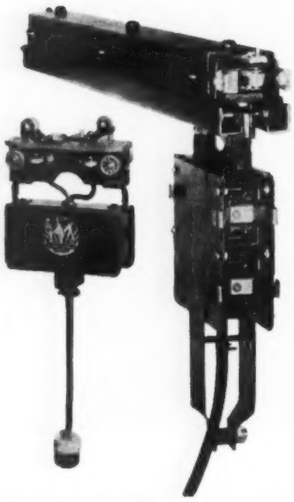


Cross-Line Starters for Different Conditions—A—watertight; B—dust tight; C—explosion proof; D—oil-immersed explosion and corrosion proof. Also general purpose, another dust-tight unit, and oil-immersed corrosion-proof unit. All automatic.—**Allen-Bradley.**

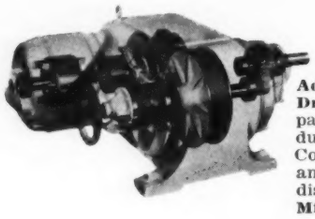


Resilient Flexible Coupling—In sizes from ¼ hp. per 100 r.p.m. to 150 hp. per 100 r.p.m.—**Crocker-Wheeler.**

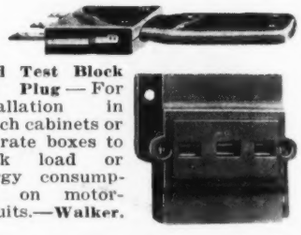
Switch Motor Control Mechanism — Rotary or reciprocating controls, simple, rugged, MG-5 equipped with ¼ hp. motor running with gears in oil.—**Pacific Electric.**



Portable Circuit — For use with portable tools, moving loads, production lines. Trolley contactor rides on busbars steel inclosed. "Trole-duct" available for a.c. and d.c.—**Bull Dog Electric Products.**



Adjustable Speed Motor-Drive—"Varidrive" compact. Provides both reduced and variable speed. Combination of gears, belt and variable diameter disks. — **U. S. Electrical Mfg.**

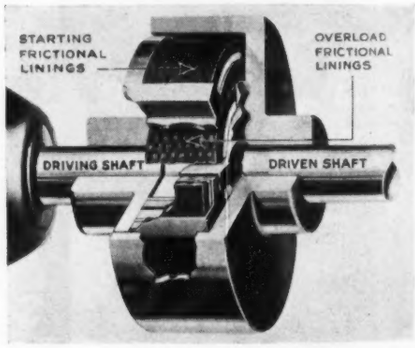


Load Test Block and Plug — For installation in switch cabinets or separate boxes to check load or energy consumption on motor-circuits.—**Walker.**

FLEXIBILITY IN DRIVE, CONTROL

Starters, switches and controls have kept pace with couplings, clutches, brakes and limit switches in making motor drives adaptable to versatility in speed, location and application. Matching them are thrustors in extended range, capacitors for corrective service, portable industrial circuits and test facilities, new refinements in operation control and in reduction of both vibration and noise.

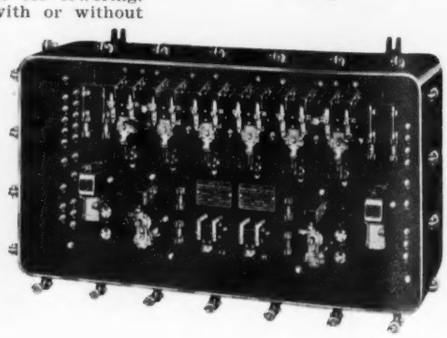
Four-Duty Coupling—Starts, couples, cushions and limits load. Motor starts free; load picked up as driving and driven shafts increase speed. Adaptable to belt, chain, gear or straight-through shaft drives.—**Falk.**



Compression-Type Industrial Breaker — Contacts in closed cylinder, arc generates gas pressure, increasing resistance of path; interruption in 0.008 second; quiet, no external arc (Type AF-1).—**Trumbull.**

V-Belt Sheave — Outside walls reinforced by convex steel plate. Practically eliminates distortion under overload.—**Allis-Chalmers.**

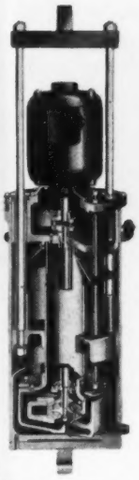
Reversing Hoist Controllers — Two, inclosed, two speeds for hoisting and two for lowering. Definite speed with or without load in either direction. Dynamic braking. —**Ward Leonard.**



Flexible Drive Coupling — For fractional horsepower motors, minimizes noise and torque. Flexible rubber, assortment of lengths.—**Guardian Utilities.**

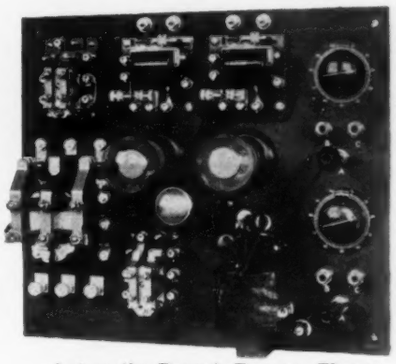
Automatic Recording Balance—Motor drives index pointer and mechanism over entire range 12 times each minute. On balance photo-cell operates recording device correspondingly to weight on hook.—**Roller-Smith.**

NEW DEVELOPMENTS IN INDUSTRIAL APPLICATIONS



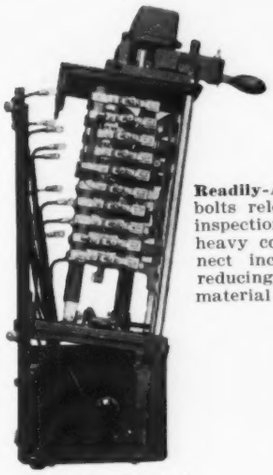
Automatic Motor Starters — Three types, 110-550 volts. Moving parts cadmium plated; removable without tools.—**Lincoln Electric.**

Breakers for Small Motors — Protects fractional-horsepower motors against low voltage, locked rotor or overload burnouts, on industrial or household appliance motors. — **Westinghouse.**



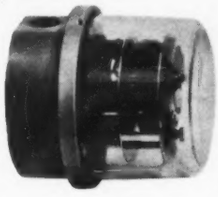
Automatic Repeat Process Timer — For automatic timing of "power on" and "power off" periods. Timer operates as long as control circuit is closed. Wide limits of time range, minute steps.—**Electric Controller & Mfg.**

Ten Ratings of Thrustor—For producing smooth, straight-line thrust and cushioned return by means of self-contained combination of motor-driven centrifugal pump, oil chamber and piston. Ratings, 2 to 16 in., 30 to 5,200 lb.—**General Electric.**

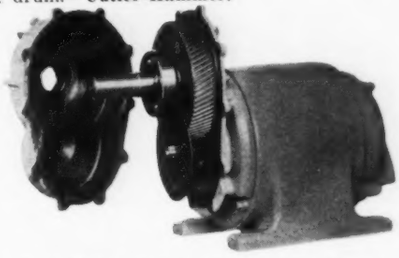


Readily-Accessible Heavy-Duty Controller—Two bolts release mechanism from conduit box for inspection, maintenance and wiring. Straight heavy copper segments with beveled ends connect incoming and outgoing fingers, directly reducing resistance one-half and permitting any material for drum.—**Cutler-Hammer.**

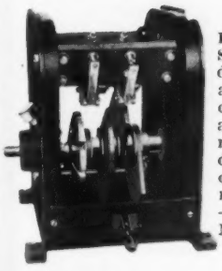
Tumbler-Type Starters—For small motors up to 1 hp., 230 volts (a.c.). Both single and double pole. Protected by interchangeable heater units (Type TT). — **Trumbull Electric Mfg.**



Time Control Located Anywhere—Without being affected by moisture or extreme temperatures. Paragon's device has terminal blocks, switches and base insulators of molded Bakelite—**Bakelite Corp.**

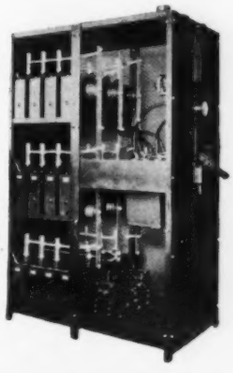


Gear-Motor Drive—Constant-speed squirrel-cage motors, helical gear reduction. Horizontal or vertical shaft. Herringbone rotors reduce hum and end play.—**Sterling.**

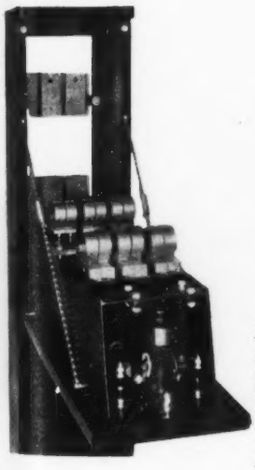


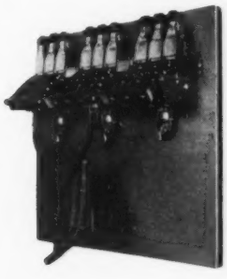
Rotating-Cam Limit Switch — Splash- and dust-proof, roller-operated silver contacts, cams quickly adjustable. Controls magnetic contactor in predetermined cycle. 1-14 cams, reversing or non-reversing action. —**Electric Controller & Mfg.**

Solenoid Cross-Line Starter — **Allen Bradley.**

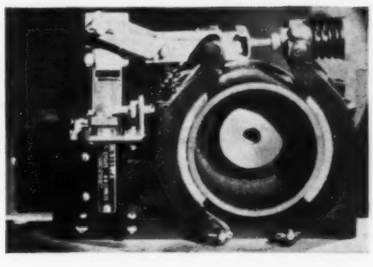


Hermetically Sealed Power Capacitors—Inerteen impregnation, reduced size, solder seal porcelain terminal bushings. Adaptable to pole mounting. Standardized assemblies from 5 kva. at 230 volts to 1,200 at 6,900.—**Westinghouse.**





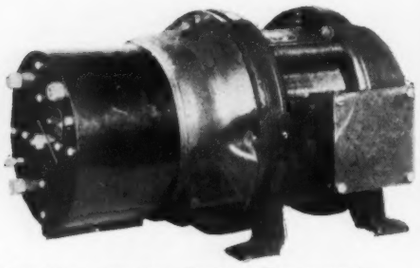
Heavy-Duty Air Circuit Breaker —One contact per pole (stationary laminated brush), high-speed opening, inverted brush, stationary latch. Type HD.—**Roller-Smith.**



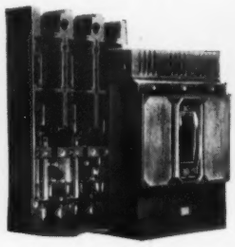
A.C. and D.C. Solenoid Brakes — Torque ratings 3 to 75 lb.-ft. low unit pressure, long, even wear, and low stresses on pivots. Low solenoid current.—**Cutler-Hammer.**

Hinged-Panel Motored De-ion Breaker —Compact, accessible, insulated-frame industrial units. Available with shunt trip, signal switches, undervoltage release, etc. Interrupting ratings up to 20,000 amp. at 600 volts. Navy units, rated 50-600 amp. at 600 volts, are shockproof.—**Westinghouse.**

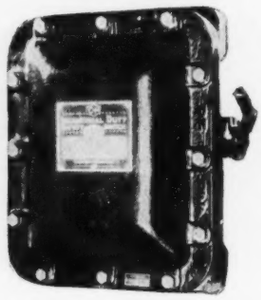
NEW DEVELOPMENTS IN INDUSTRIAL APPLICATIONS



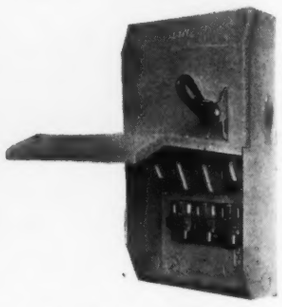
Disk-Type Electric Brake—For mounting directly on motors and for controlling small hoists, cranes, winches, and similar equipment. Compact, smooth-acting and similar to automobile clutch of multiple-disk type. Rating, 50 lb.-ft. on continuous basis, 75 lb.-ft. intermittent.—**General Electric.**



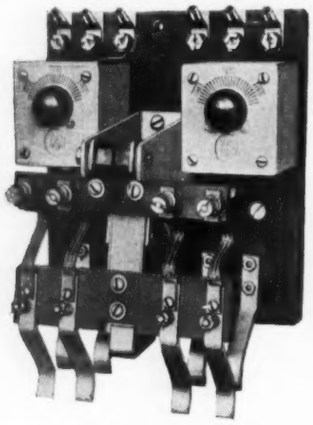
Three-Pole Breaker in Two-Part Case—I-T-E Company's "Itelite" circuit breaker has all electrical parts and partitions molded in Bakelite. — **Bakelite Corp.**



Explosion - Proof Safety Switch — Up to 200 amp. Outside gases will not ignite. Single or double throw. Outside operating handle. Accommodates three padlocks for open and closed positions. Weatherproof semi-steel case.—**Cutler-Hammer.**

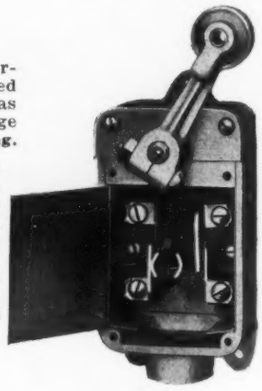


Heavy - Duty Safety Switch — Semi-floating wiping - wedge contacts. Unit base readily removable, large gutter space. Cadmium - plated cabinet with padlock hasp and knockouts. — **Electric Controller & Mfg.**



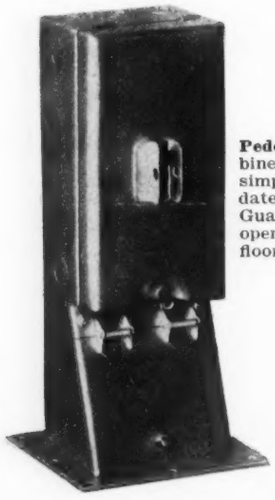
Weatherproof Cross-Line Starter — For 110-550-volt motors up to 50 amp. (inrush 225 amp.). Oil immerses roller-type contacts and lubricates working parts.—**Electric Controller & Mfg.**

Variable-Speed Drive — Helical gear-reduction unit built into variable-speed motor. Speeds as low as six and high as 4,000 r.p.m. Ratios up to 30:1 in large units, and 50:1 in small units.—**Sterling.**



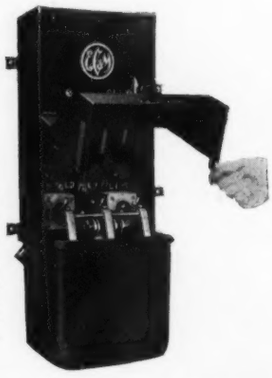
Track-Type Limit Switch—For making or breaking control or indicating circuits at a definite point in travel or motion of a machine. One normally open, one normally closed circuit. Overtravel (54 deg.) causes no damage; moving arm 18 deg. operates mechanism. — **General Electric.**

Safe Fuse-Puller Tests Circuits—Neon lamp in one leg of Ideal Commutator Dresser product which is of special high-insulation Bakleite.—**Bakelite Corp.**



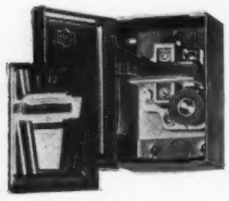
Pedestal Switch Cases — Combined cabinet and pedestal simplifies mounting. Accommodates standard starting switches. Guards handle; can be locked open. Other designs for underfloor boxes.—**Walker.**

Safety Switch and Cross-Line Starter — For 110-550 volt, 2-phase, 3-wire or 3-phase motors. Unit panel carries two vaporproof thermal relays and magnetic contactor. Local or remote control; low-voltage release. Type "ZOS" up to 75 amp. inrush 400 amp.—**Electric Controller & Mfg.**



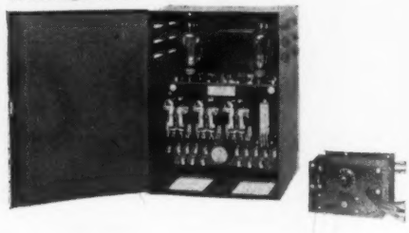
Built-In Overload Protection—"Thermoguard"—a small thermostat built into windings — warns of excessive winding temperature and disconnects motor. Protects against clogged ventilation passages, high ambient, too frequent starting or reversal.—**Westinghouse.**

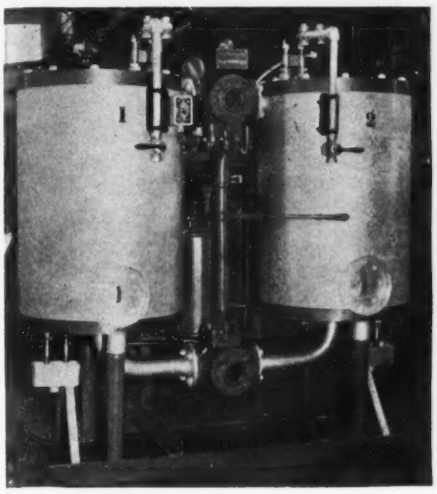
Variable Speed Motor Drive—High-efficiency squirrel-cage motor with mechanical speed-changing. Uses variable-diameter pulleys and V-belt construction to change speed while motor is operating. Available ½ to 25 hp. ratings; speed ratios 4:1, 3:1 and 2:1.—**Sterling.**



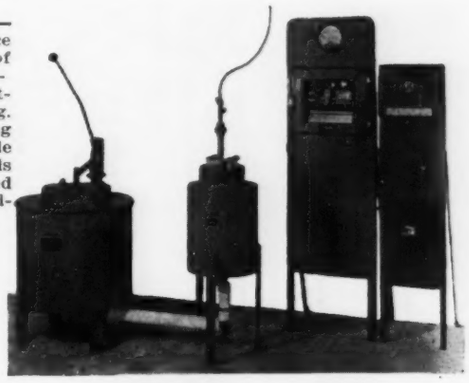
Toggle - Operated 30 - Amp. Safety Switch — Toggle double - pole mechanism; positive, fusible. Can be padlocked open or closed.—**Cutler-Hammer.**

Register Cutter Regulator—For high-speed cutting of printed paper, cellophane, cloth, etc. Actuated by control spot on strip and phototube detector.—**Westinghouse.**

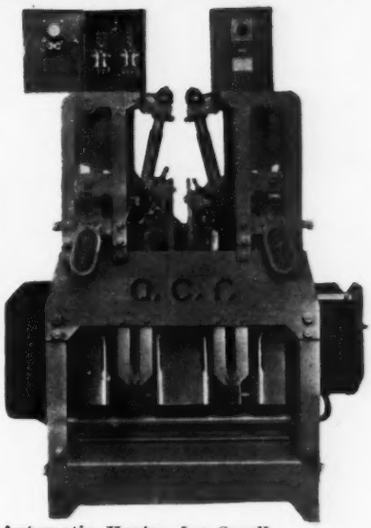




Triple Control of Hardening—"Vaporcarb" control of furnace atmosphere avoids necessity of packing any tool, even high-chrome, high-carbon; avoids pitting, scaling or decarburizing. Automatic control of heating rate gives faster allowable speed. "Hump" control holds quench temperature any desired time, assuring depth of hardness.—**Leeds & Northrup.**



Air and Gas Drier — For use with controlled - atmosphere heat treating, dehumidification and gas conditioning. Dew points of 60 deg. C. regularly obtainable. Activated alumina adsorbs moisture and reactivated by electricity. — **Pittsburgh Lectrodryer.**

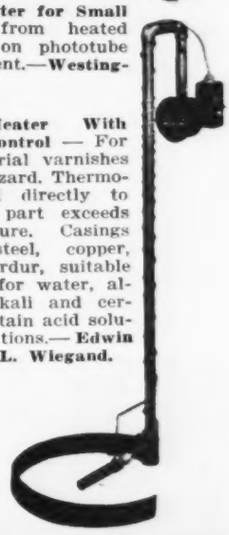


Automatic Heater for Small Parts—Light from heated metal falling on phototube controls current.—**Westinghouse.**

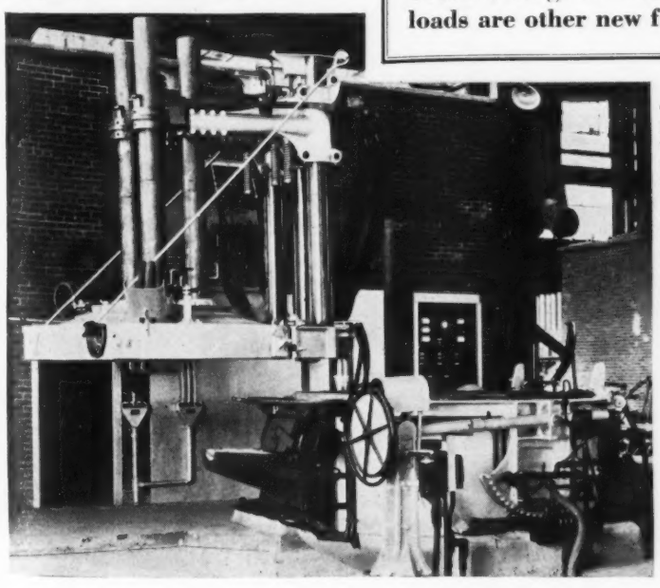
Industrial Air Preheaters—For drying containers, spraying smooth coat of paraffin, etc. Air entering at right directed by baffles from bottom to top and down center over "Chromalox" strip heaters through bottom discharge. Available in different sizes and ratings — 500 watts to 500 kw. — **Edwin L. Wiegand.**

FINER FURNACE CONTROL

Notable among furnace developments are advances in preparing, pretreating, supplying and circulating the controlled atmosphere for high grade production. Likewise there has been provided means for automatically governing the rate of temperature rise and the duration at the hardening hump. Top charging for quick and economical operation and maintenance, photoelectric control of parts temperatures, equalization of temperatures and prevention of overshooting in densely packed loads are other new factors.



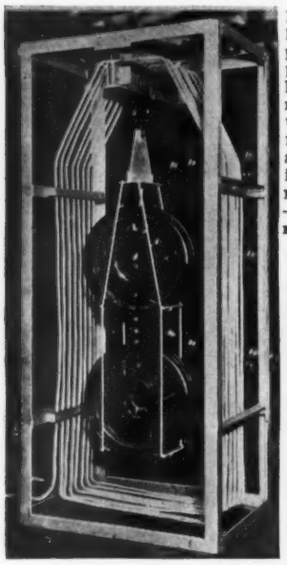
Immersion Heater With Thermostat Control — For heating industrial varnishes without fire hazard. Thermostat connected directly to heater so no part exceeds safe temperature. Casings available — steel, copper, monel or Everdur, suitable for water, alkali and certain acid solutions.— **Edwin L. Wiegand.**



Top-Charge Melting Furnace—Roof with electrode superstructure raised hydraulically and rotated horizontally by rack for quick charging with drop-bottom bucket loaded by electromagnet in scrap yard. Savings reported of $2 to $3 per ton, 7 per cent in demand, 7.5 per cent in consumption, 23.3 per cent in refractory replacement.—**Pittsburgh Lectromelt.**

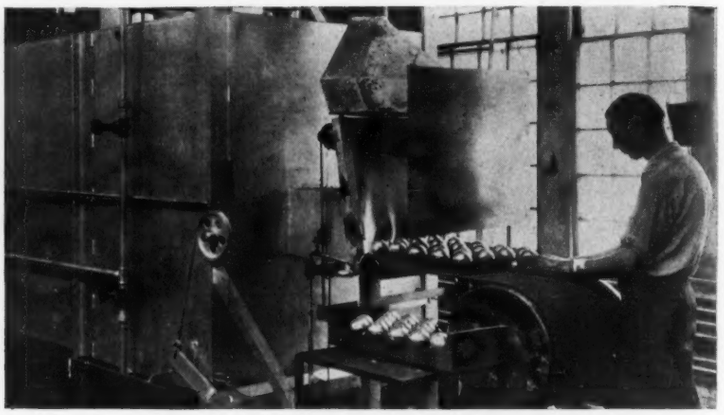
Tempering Furnace for Dense Loads—Fan pulls air past heater coils and forces through load. Produces uniform heating. "Micromax" recording control prevents overshooting temperature; —**Leeds & Northrup.**

NEW DEVELOPMENTS IN ELECTRIC HEATING



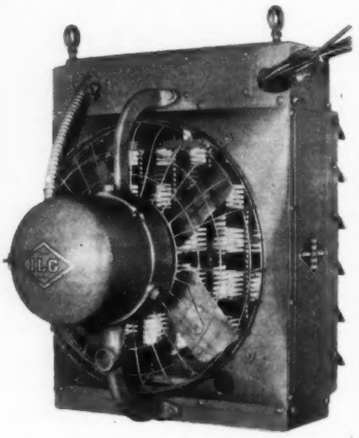
Element of Induction Drying Oven — Applicable to drying paint, enamel and lacquer. Heating of metal parts by induction causes drying from inside outward, avoiding case hardening and wrinkles, and reducing drying time. —**Apax Electrothermic.**

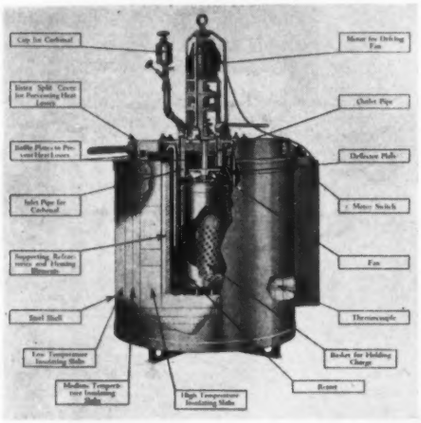
Coiled Strip Immersion Heater — Developed especially to expedite emptying drums of cocoanut oil in bakeries. Inserted in drum head and heated, it settles to bottom, liquifying oil. Diameter 19 in. Rating 230 volts, 5 kw. Chromalox "Koil Strip." — **Edwin L. Wiegand.**



Mesh-Belt Conveyor Furnace—For continuously copper-brazing, at 2,060 deg. F., steel assemblies (refrigerators, cash registers, etc.) Parts come from cooling chamber clean and bright with strong bonds. Also used for bright-annealing. 88 kw. Working dimensions, 20 in. x 10 in.— **General Electric.**

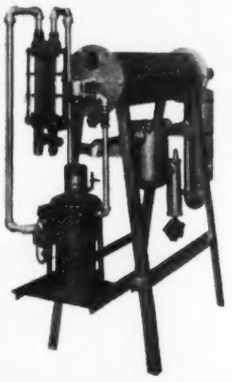
Heavy-Duty Immersion Heaters —For asphaltum - compound processes, fuel-oil storage tanks, etc. Low heat density—7 watts per sq.in. Rated 1 to 5 kw. each. Can supplement steam for higher temperatures. — **Edwin L. Wiegand.**



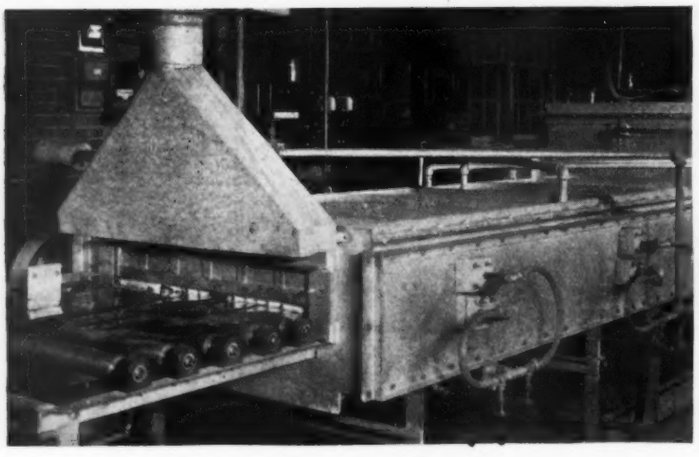


Vertical Carburizing Furnace — Directed circulation of carburizing gas (Carbonal) assures uniform case depth. Small floor space. Less labor. Usable for nitriding, annealing, normalizing, hardening and tempering with slight change.—**Hevi-Duty.**

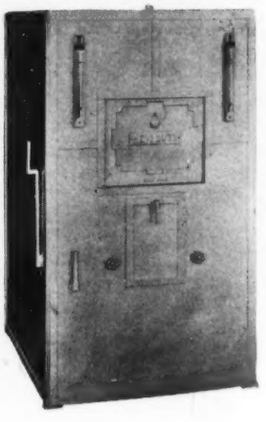
Heater-Blower Unit — Suspended from ceiling or wall. Rating 5-60 kw. Includes temperature control. —**Ilg Electric Ventilating.**



Electric Furnace Atmosphere Controller — Has combustion chamber in which city gas, natural gas or butane is reformed. Moisture removed by cooling coils; oxygen by purifier.—**General Electric.**

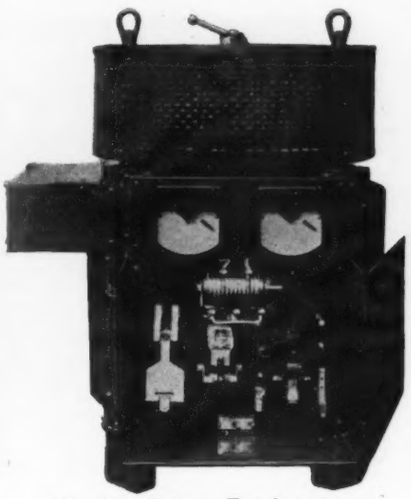


High - Temperature Box Furnace—Heated to 2,300 deg. F. with metallic resistors having 45 per cent greater resistance than nickel-chromium and higher current capacity. Radiant-plate resistor mounting. Gas-curtain atmosphere control. — **Hevi-Duty.**



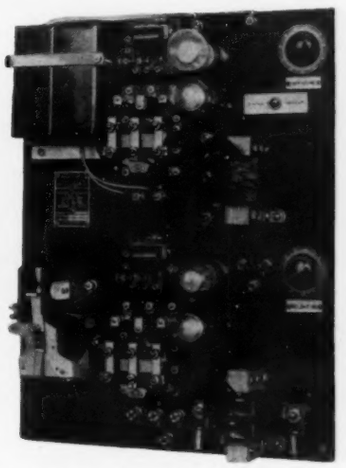
Controlled - Atmosphere Roller-Hearth Furnace—Work moves continuously along driven rolls through non-oxidizing atmosphere, emerging normalized, bright, clean, free from scale. Also used for continuous brazing. — **Westinghouse.**

NEW DEVELOPMENTS IN ELECTRIC WELDING



A.C. Arc Welder—For heavy-current welding—automatic, also suited to hand applications. Absence of magnetic blow in arc and slightly greater speed, with full penetration when making filet welds and working into corners. Three transformers available, rated 500, 750 and 1,000 amp. on one-hour basis; primaries up to 550 volts; 60, 50 or 25 cycles; single-phase.—**General Electric.**

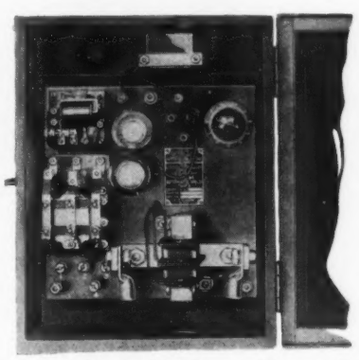
A.C. Welder — "Shield-Arc" unit converts 2 or 3 phase into single-phase lower-voltage higher frequency for welding. Power factor double that of former type. Two sizes for 220, 440 or 550 volts, 2 or 3 phase.—**Lincoln Electric.**



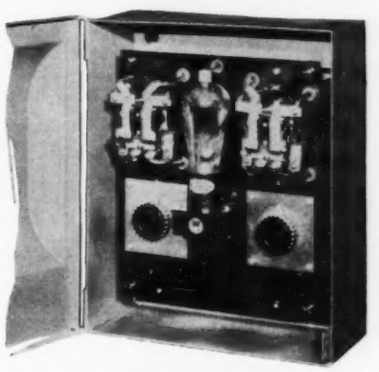
Automatic Repeat Weld Timer—For use with automatic welders having electrodes operated hydraulically or by air. Determines the time of welding as well as time for movement between welding positions, the first governed by current and hand setting and the second adjustable by operator for desired speed of operation.—**Electric Controller & Mfg.**

WELDING AND SURFACING

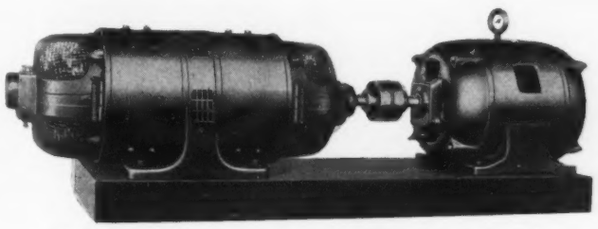
Better adapted to metallurgical and operating requirements. For wider range of metals, including cast-iron, steel alloys and aluminum. Very thin to heavy plates weldable. More stable arcs, automatic starting, higher speeds, better penetration, greater uniformity of product. Simplicity and flexibility of control. Remote control and automatic timing. Automatic operation for repetitive tasks. Improved a.c. sets with higher power factor. More portable units. New electrodes for every purpose.



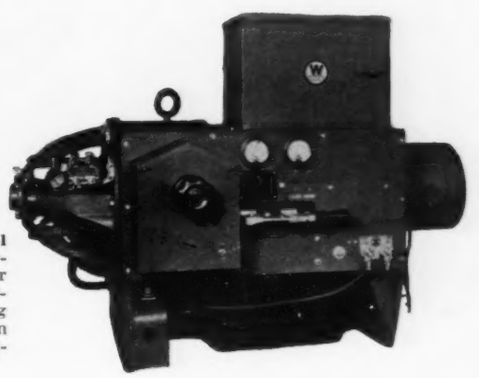
Automatic Weld Timer—For producing uniform resistance welds and reducing discoloration and indentation, by basing welding time on current. Hand set by dial and triple-range plug for range of work handled, but automatic for each heat cycle. Compensates for thickness of pieces handled, variation in number, drop in voltage, variations in resistance of circuit. Two sturdy electronic tubes in timer circuit—one passes small current; rectifier works at part capacity.—**Electric Controller & Mfg.**



Electric Timer for Welding—Also, for X-ray exposure, etc. Automatically times duration at 1/10 to 45 seconds after push button or treadle is actuated. 10 amp., 115 volts or 5 amp., 220 volts, a.c.—**Westinghouse.**

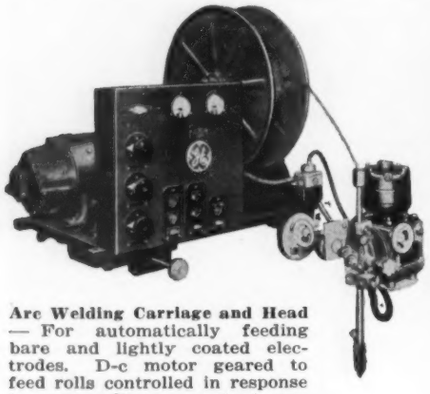


Duplex Motor-Generator for Welding—Two independent generators on one two-bearing frame flexibly coupled to three-phase motor. Operate without ballast resistor and deliver non-pulsating direct current maintained at low value by characteristics.—**Century.**

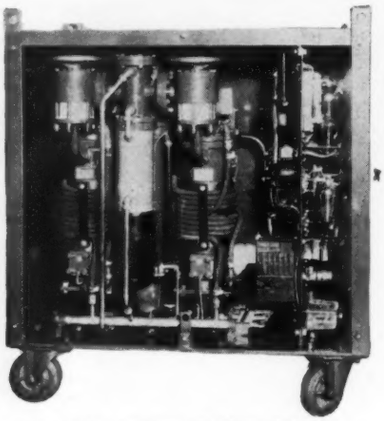


Remote Control Welding Generator — Operator can adjust current by tapping electrode on work. — **Westinghouse.**

NEW DEVELOPMENTS IN ELECTRIC WELDING



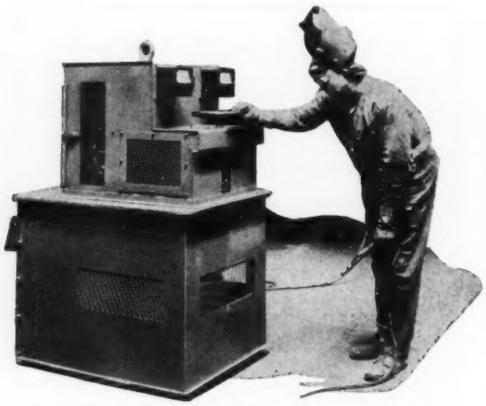
Arc Welding Carriage and Head — For automatically feeding bare and lightly coated electrodes. D-c motor geared to feed rolls controlled in response to arc voltage, constant arc length maintained. Feed rate adjustable while operating. Compact, position of nozzle readily adjusted.—**General Electric.**



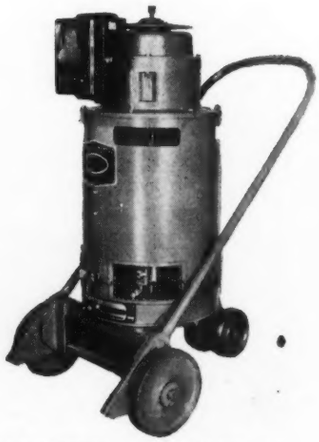
Portable Ignitron Welding Timer —For resistance welding, fabricating aluminum alloys and high-strength steel. Passes 700 kva. at 440 volts. Timing adjustable from 1 to 30 cycles on 60-cycle power.—**Westinghouse**

Mineral-Coated Welding Electrodes—Spiral wrapping of asbestos yarn anchors extruded coating to core wire. Prevents cracking when bent and wandering of arc. For flat, vertical, overhead and fillet welding of mild steel; for manganese, stainless, Cor-Ton, Cromansil and other high-strength steels.—**Metal and Thermit.**

Low-Priced Welder for Light Work—Current range 20-100 amp. without auxiliary devices. Type SA 75 uses as small as $\frac{1}{16}$-in. electrodes. For materials as light as 26 gage. Motor-generator operates on 110-volt circuit. Unit quite similar externally supplies 20-125 amp., operates on 110 or 550 volts, 2 or 3 phase; connections for 220 or 440 volts.—**Lincoln Electric.**

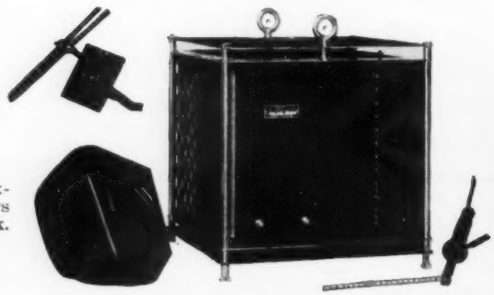


Welding Transformer with Protective Control—750-amp. unit for a.c. welding of thick-shell pressure vessels.—**Westinghouse.**



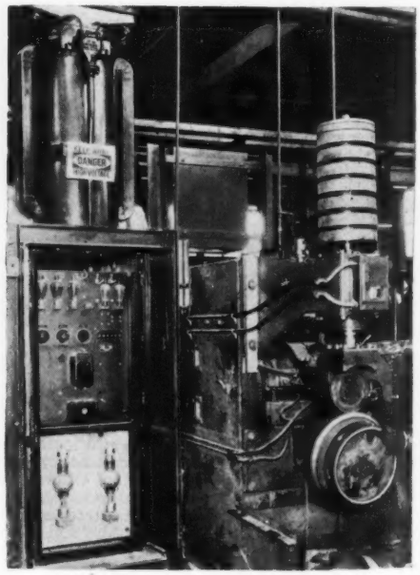
Low-Current Arc Welder—50-amp. vertical welder, for light-gage metals, stable high-speed arc. Single adjustment for entire welding range.—**P & H Hansen.**

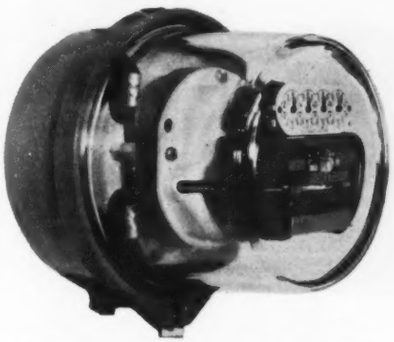
Remote-Control Welder—Without extra cables operator raises or lowers current by tapping electrode on work. —**Lincoln Electric.**



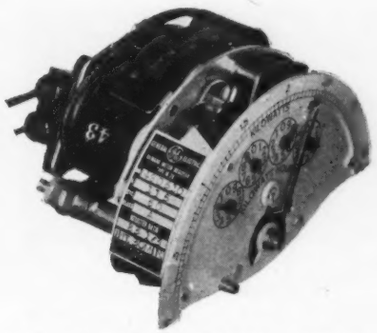
Automatic Arc Torch and Welder —For bronze and hard surfacing and welding wide range of sizes and thicknesses. Four sizes 2, 6, 10 and 15 kw. The last two operate on 220 volts, 60 cycles. Six-step heat control, self-adjusting voltage regulator, ionizing-type arc starter and transformer in single case, 200-280 lb.—**Electric Torch.**

Thyratron Tube Welding Control—For intermittent line and spot welding. Results in greater uniformity and higher speed, and welding of stainless steel without discoloration, individual spots made in short time, only steel at weld heated.—**General Electric.**





Detachable Watt-Hour Meters—Indoor or outdoor. Easy reading, test and removal. Adapted to conduit or channel wiring. One size socket interchangeable in all ratings. One seal. Protection against diversion. — **Westinghouse.**

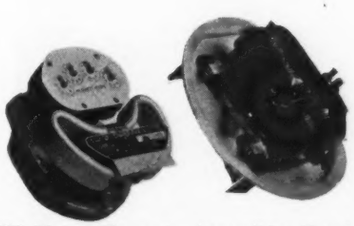


Demand Register — Reliable timing, protection against abnormal conditions and quick and easy testing (M-20).— **General Electric.**

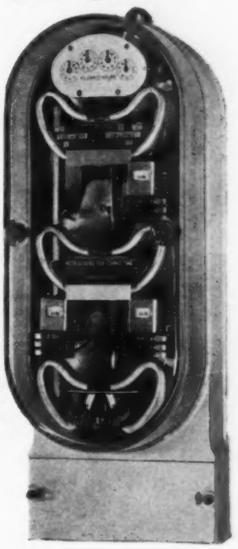
New Sequence Meter—Diversion proof, inclosed wiring, indoor or outdoor. Type A for existing installations, B with safety disconnects incorporated, C adds "complete lock-up," S in socket detachable design.—**Sangamo.**

METERS FEATURE INNOVATIONS

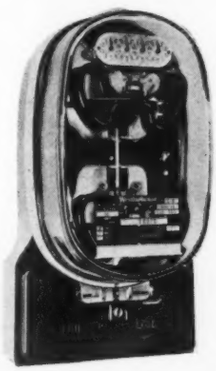
Movement in the realm of power metering has been marked by the introduction of watt-hour meter mountings designed to thwart diversion and promote standardization and interchangeability. Prepayment meters and combined meters and time switches are ready for the "when, as and if" day. Among new instruments are those for field testing of dielectrics and insulation generally to locate faults and cull them out—on line or in equipment. Switchboard instruments are more compact and legible. Portables are extended in scope and service attractiveness.



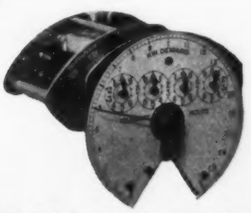
MF Meter Element—Accessible. Front adjustments. Clampless. MF-A—7.2 lb.; MF-S—6.7 lb. Interchangeable electromagnets. Two potential elements and six current elements take care of all meters of 5, 15 and 50-amp. rating.—**Duncan.**



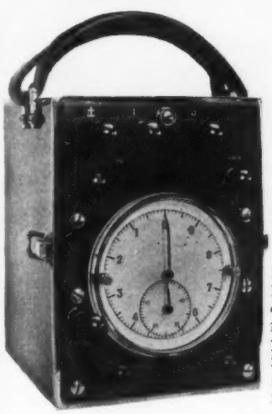
Three-Element Polyphase Watt-Hour Meter—Electromagnets interchangeable with single-phase meters. Indicates open potential circuits. "Microset" adjustments speed testing. Type MF for 3-phase, 4-wire circuits.—**Duncan.**



Polyphase Watt-Hour Meter — For three- or four-wire. Die-cast base. Electromagnets interchangeable. No cover studs. One-piece molded terminal block. — **Westinghouse.**

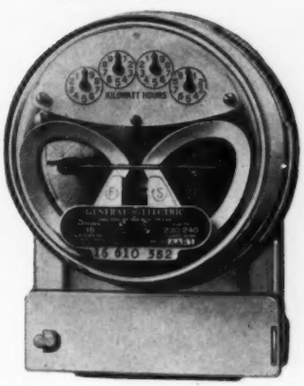


Single-Phase Watt-Hour Meter—Designed for ready adaptation to all kinds of installation. — **General Electric.**



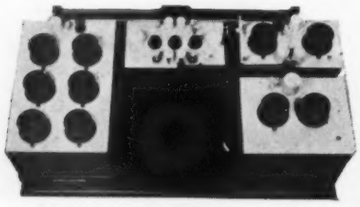
Block-Interval Demand Register—Reset device requires negligible energy, synchronous motor used only as timing device except to release demand gearing. — **Westinghouse.**

Portable Standard Watt-Hour Meter—Type CP for calibration of service meters, micrometer adjustments. Improved damping and capacity-change switch. Refined register and reset mechanism.—**Westinghouse.**

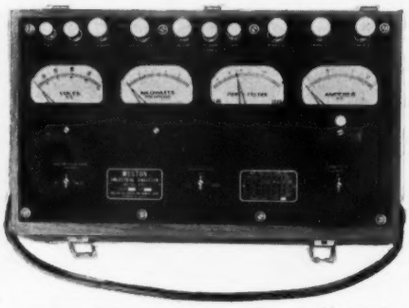


Prepayment Meter — Type HCP. Quarter coin mechanism. Any rate 3 cents to 25 cents in ½-cent steps. —**Sangamo.**

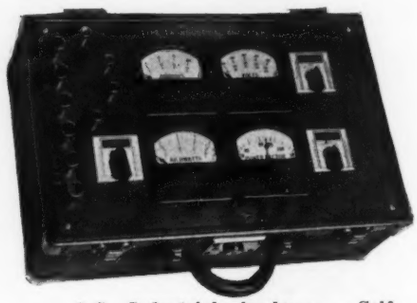
NEW DEVELOPMENTS IN METER EQUIPMENT



Bridge for P.F. of Dielectrics — Shielded for precise measurement of phase angle of A.S.T.M. samples of insulating oil, ceramics and other dielectrics up to 50 kc.—**Leeds & Northrup.**

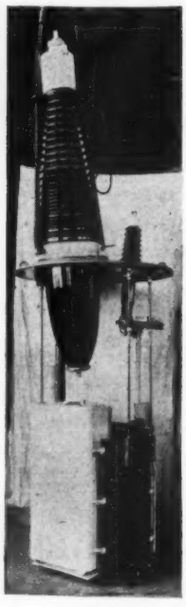


Industrial Analyzer — For industrial loads, single or polyphase, test connections minimized, up to 125 amp. and 600 volts. Adjustable stop for starting-current.—**Weston.**

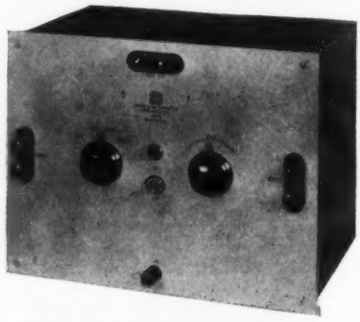


A.C. Industrial Analyzer — Self-contained, for measuring all a.c. circuits up to 100 hp. and 575 volts. Triple range ammeter, voltmeter, wattmeter and power-factor meter with switches and transformers self-contained, 35½ lb. — **Westinghouse.**

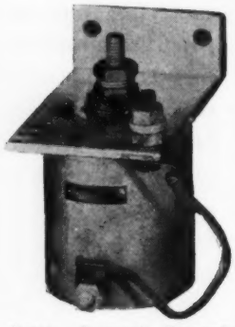
Surge-Crest Ammeter — Surge current measurement on transmission-line steel tower legs, wood-pole ground leads of distribution systems, lightning rods and counterpoise wires.—**General Electric.**



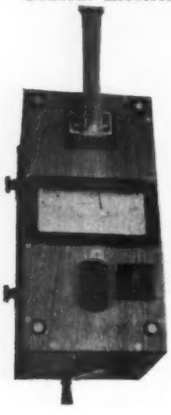
132-Kv. Instrument Transformer—This unit has a 76,200/132,000 Y volt primary, secondary 63.5/110 volts Y or 110 volts delta. Capacity 500 volt-amperes, 50/60 cycles.—**Allis-Chalmers.**



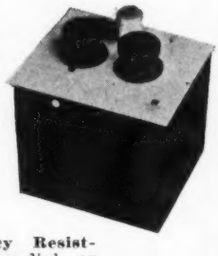
Amplifier for Precision A.C. Bridges —Detects balance of audio-frequency bridges. Voltage sensitivity 3 microvolts. Self-blocking, tunable.—**Leeds & Northrup.**



Surge Current Recorder —Records for applying protective devices, spotting severe duty, analyzing flashovers, service comparison of protective equipment. — **Westinghouse.**



"Megger" Capacity Meter — Portable, direct-reading, multi-range, self-contained source of test current. Locates open-circuit faults in cables. — **J. G. Biddle.**

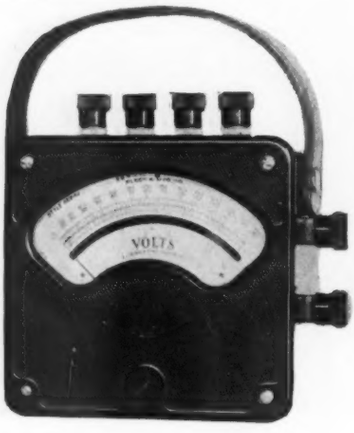


Standard Air Capacitor — Completely shielded, adjustable low capacitance range to 1,300 mmf., residual 50 mmf. — **Leeds & Northrup.**

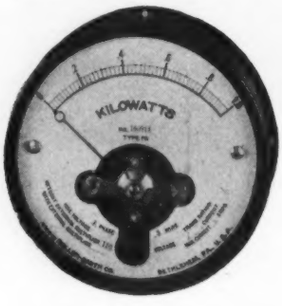
High-Frequency Resistance Box—Four-dial or six-dial, shielded or unshielded, any frequency from audio to radio.—**Leeds & Northrup.**

Portable A.C. Instruments—Repulsion iron-vane type. Full scale accuracies of ¾ or ½ per cent respectively.—**Westinghouse.**

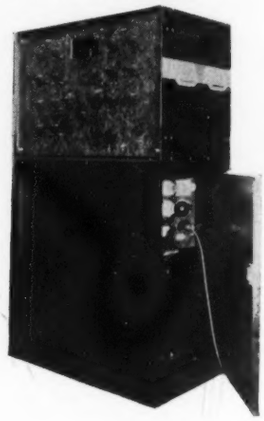
Portable Power-Factor Tester — Schering bridge, for dielectric and p.f. tests of condenser bushings in field.—**Westinghouse.**

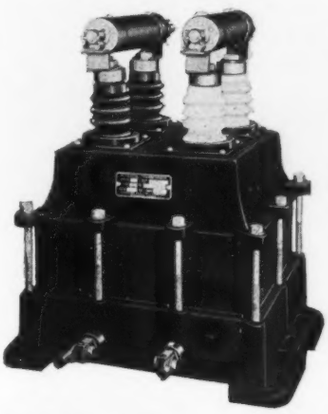


Polyphase Panel Wattmeter —Addition to 4-in. line of a.c. and d.c. ammeters and voltmeters. Two-element. Rated 5 amp., 125 or 250 volts.—**Roller-Smith.**

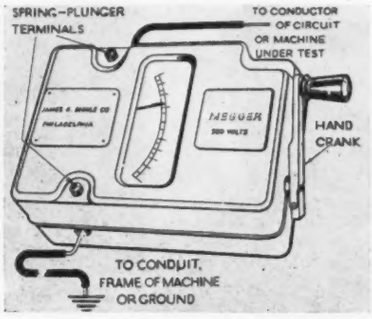


Rectangular Panel Instruments — Three-inch, Bakelite panel, easily read scale, a.c., d.c., radio-frequency capacities available. — **Weston.**

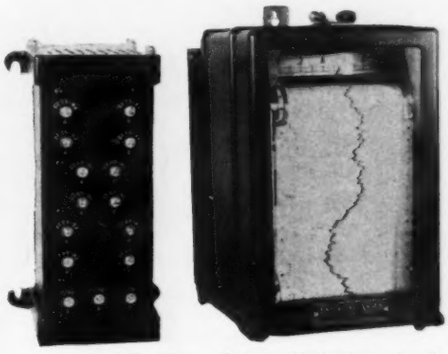




Instrument Transformer—Both current and potential transformers available, increased accuracy, lighter weight, stronger against disruptive forces.—**Sangamo.**


SPRING-PLUNGER TERMINALS
TO CONDUCTOR OF CIRCUIT OR MACHINE UNDER TEST
HAND CRANK
MEGGER
TO CONDUIT, FRAME OF MACHINE OR GROUND

Midget "Megger" Tester—For insulation resistance measurements; 3 pounds, range 0—20 megohms.—**J. G. Biddle.**

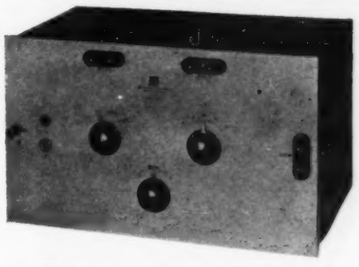


Graphic Kva. Meter—Embodies standard Model A.W. wattmeter with phase-shifting network to supply lagging potential corresponding to average power factor. Three taps cover power factors from 0.54 to 0.94. Error not to exceed 1¼ per cent. Network tap permits measuring Rva. Network furnished for existing meters; 100-200-volt range; potential transformers for higher voltages.—**Esterline-Angus.**

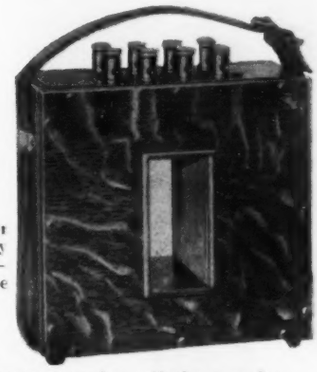
METERS

Demand register attachments. Graphic kva. and remote metering. More rugged and more accurate instrument transformers, even 132-kv. units. Wider-range portable standards and meggers. Noise analyzers. Phase-sequence indicators. Open-circuit fault locators. Combined meters and time switches. Automatic demand control. Lighter weight loading resistors. Rectangular units to save panel space. To aid maintenance and testing there are such refinements as interchangeable magnets, more accessible adjustments, potential indicators, simplified terminal blocks.

Portable A.C. and D.C. Instruments—Government specifications, NPD line includes d.c. ammeters and voltmeters of all ranges. NPA is companion line of a.c. instruments.—**Roller-Smith.**



Oscillator for Precision A.C. Bridges—One-watt output, frequencies provided are 500, 1,000, 2,000 c.p.s., adjustable to 0.1 per cent.—**Leeds & Northrup.**

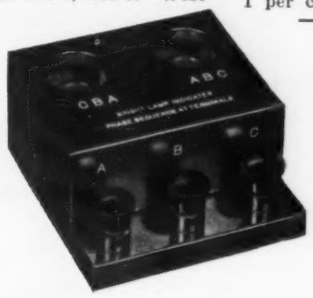


Precision Current Transformer—For industrial and laboratory standard uses. Tripled range—from 100/5 to 2500/5 in one instrument.—**Weston.**

Supersensitive Instruments—Cobalt steel magnets and finer wire coils extend range of sensitivity to as low as 0—20 microamperes and 0—3 millivolts, d.c. Types PX-4, PX-5.—**Westinghouse.**

Portable Instruments—An entirely new design. Over-all accuracy is three-fourths of 1 per cent of full scale.—**General Electric.**

Photocell Instrument With Molded Case—M-H-R Laboratories Colorimeter. Light weight. Insulated in molded Bakelite.—**Bakelite Corp.**

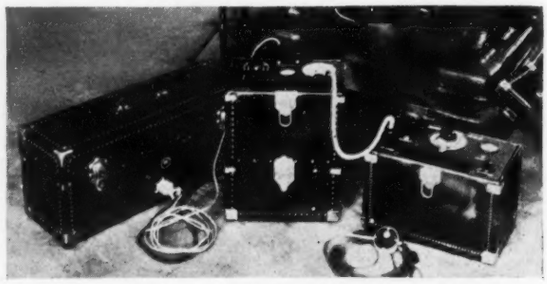


Phase-Sequence Indicator—Capacitor-glow-lamp type for use in polyphase installations.—**General Electric.**

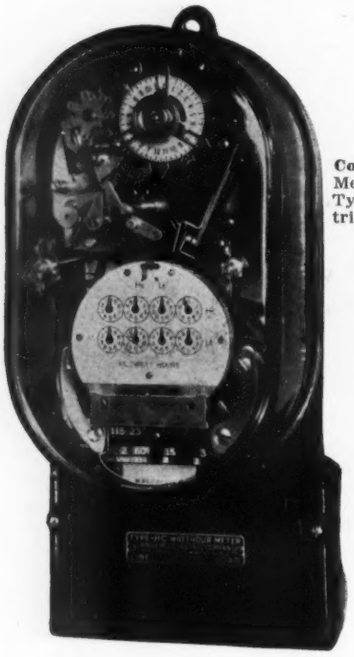
NEW DEVELOPMENTS IN METER EQUIPMENT

Light-Weight Loading Rheostat —15-lb., 4,000-watt intermittent duty, plug connections, insulated feet, folds for carrying.—**Ward Leonard.**

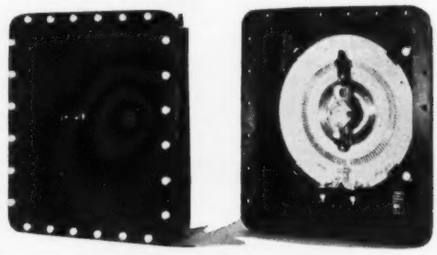
Sensitive Portable Instruments — A.c. d.c., millivoltmeters and milliammeters for thermocouple, pyrometer and electron tube service.—**Weston.**



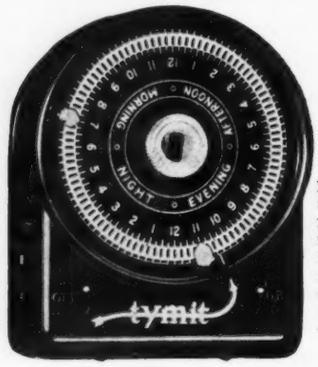
Noise Analyzer — Measures intensity of each component frequency of noise as well as total noise, to ascertain seriousness and possible cause. Self-contained; no outside power needed. —**Westinghouse.**



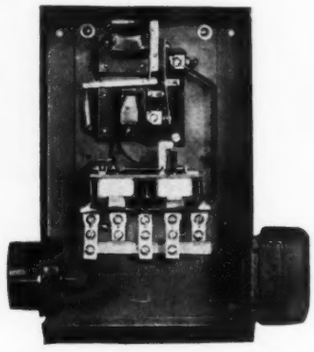
Combined Meter and Time Switch— Measures and controls off-peak loads. Type HC. Synchronous motor or electrically wound motor.—**Sangamo.**



Explosion-Proof Inclosures for Rheostats — Leads packed, cover removable. Contacts cleaned without removing rheostat.—**Ward Leonard.**



Domestic Time Switch — Portable for refrigerator defrosting, burglar lighting, roasting, furnace, oil burner, etc. Synchronous movement, 5 amp. —**Tork.**

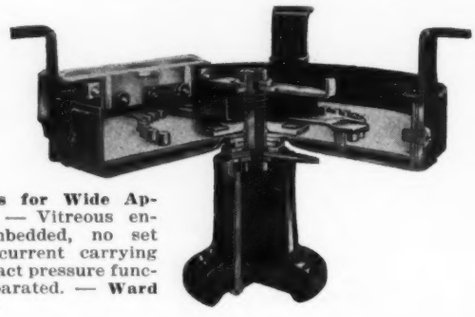


Automatic Demand Control —Used between range and water heater to limit demand. Instantaneous, magnetic (no thermal devices), adjustable. —**Wesix.**

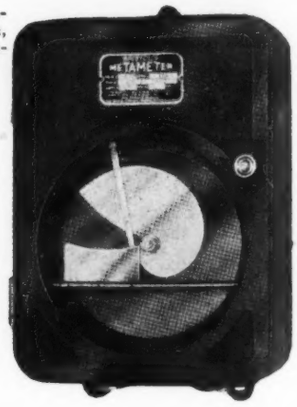
Primary Time Switches— R-C-O-L oil switch combined with Sangamo low-voltage time switch affords 20 combinations up to 7.5-kv. Precision astronomic dial gives full automatic operation.—**South Bend Electric Controller.**

Socket-Mounted Time Switch—With either synchronous or electrically wound mechanism. 40-amp. contacts. 1, 2 or 3 on or off periods each day.—**Sangamo.**

Rheostats for Wide Application — Vitreous enamel embedded, no set screws, current carrying and contact pressure functions separated. — **Ward Leonard.**



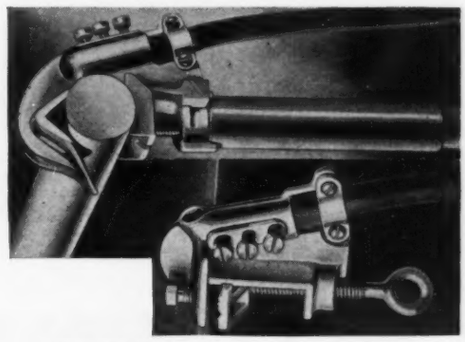
Remote Measurement of Quantities—"Metameter," any frequency for impulse transmission, no relays, unlimited distance, small power consumption, non-interfering.—**Bristol.**



NEW DEVELOPMENTS IN WIRING DEVICES

Outdoor Meter Inclosure—Various lengths; accommodates all sizes and makes of single-phase indoor meters. Weather and diversion proof. Drawn steel. Bull's-eye glass seal or standard seal. Test blocks of various types. No. 7500.—**Corcoran-Brown.**

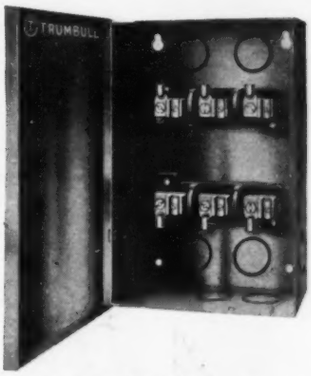
Fused Line Tapper—Clamped directly to line wire, whether dead or alive, and easily re-fused with Tips positive-grip clamp stick. Requires no crossarm support. Weight 3½ lb. For transformer or branch-line connections—**Tips Tool.**



Tap-Off and Ground Clamps—Stronger and lighter, cast copper or aluminum for either or both forms of conductor.—**Kearney.**

Meter Entrance Switch—Slide cover exposes fuse plug. "Twist-out" section in wiring trough—**Cutler-Hammer.**

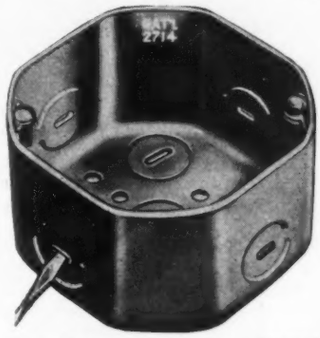
All-Rubber Lamp Cord—Superior 1/32 in. insulation; no fraying. Variety of colors with plugs to match. Type PO-SJ.—**Belden.**



Inclosed Fuse Blocks—Two- or three-pole, 250- or 600-volt, 30-600 amp., black or cadmium-plated inclosures. "Vystipe" fuse terminals minimize fuse heating.—**Trumbull.**

FROM LINE TO ENTRANCE

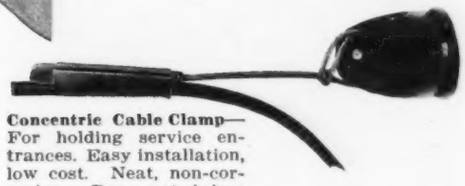
Paralleling advances in meters to make them tamper-proof has been the corresponding improvement in boxes to inclose both the new and the older types of meters. For multiple installations there are new ganging facilities. For the line are departures in clamps, fused taps, connectors and solderless lugs. At the house wall new concentric cable clamps, knobs and connectors are available for application.



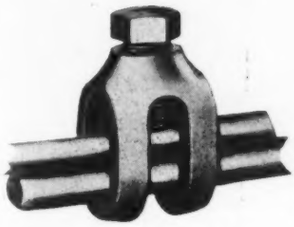
Easy-Knockout Boxes—Slotted opening in center of each knockout facilitates removal from exterior or interior with screw driver by prying up and down.—**National Electric Products.**

Knob for House Wall—Non-rigid screw (galvanized or Everdur) facilitates alignment; 1-in. hole takes all wires; easy tie-in. Called Fit-Rite.—**Kearney.**

Cellophane-Covered Enameled Wire—High dielectric strength and space factor. Effectively bonded to protect against moisture and heat. Sharp bends made without cracking. "Celenamel."—**Belden.**



Concentric Cable Clamp—For holding service entrances. Easy installation, low cost. Neat, non-corrosive. Does not injure cable.—**Reliable.**

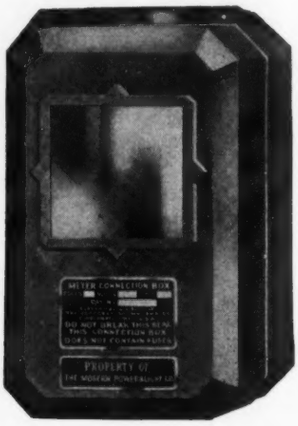


House Service Connector—Simple, easily installed, will not loosen by vibration, body and bolt of Everdur.—**Line Material Company.**

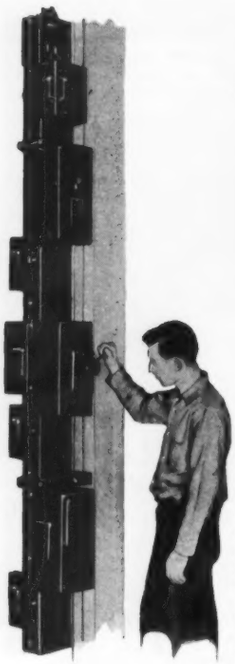
NEW DEVELOPMENTS IN WIRING DEVICES

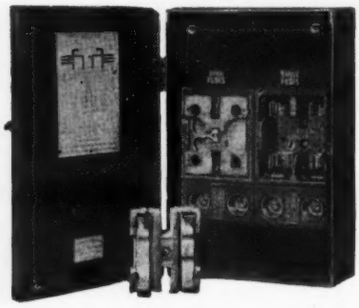
Automatic Line Splice—For No. 6 to 250-circ.mil. conductor. (A) Entrance washers facilitate insertion of stranded cable. (B) Spring retainer cups hold spring and grips in alignment and insure proper length insertion of cable. (C) Added thickness for strength.—**Electroline.**

Die-Cast Aluminum Meter Inclosures—Made in various depths. With or without standard test blocks. Take ¾, 1 and 1¼-in. fittings. For diversion-proof outdoor installation of present meters. Type CB-14.—**Corcoran-Brown Lamp.**



Service-Entrance Connector—Connects wires end to end. Low cost. Spring action of yoke prevents vibrating loose. "Everdur" high strength.—**Reliable.**

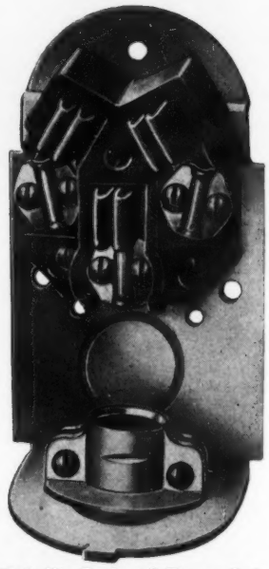




Range-Entrance Switch—For new sequence metering. Pull type, dead front. Fuses not pulled with switch. Live parts inaccessible.—**American Electric Switch.**

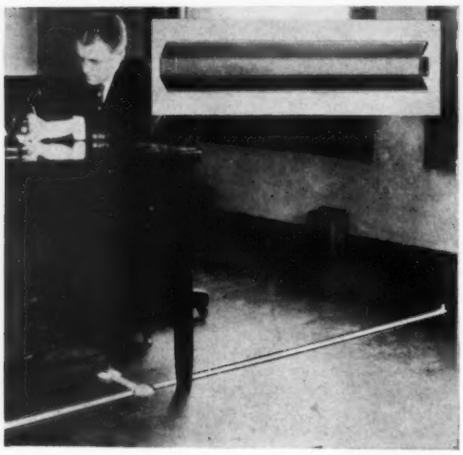
Metal-Clad Bus Distribution—Metal-duct inclosed bus-type feeders, joined in 10-ft. lengths, for straight or curved runs with panel-covered openings at intervals for quick attachment of branch circuits, switch cabinets, etc. Readily adaptable to extension or changes, vertical or horizontal construction; high salvage value. "BUStribution" system.—**Bull Dog Electric Products Co.**

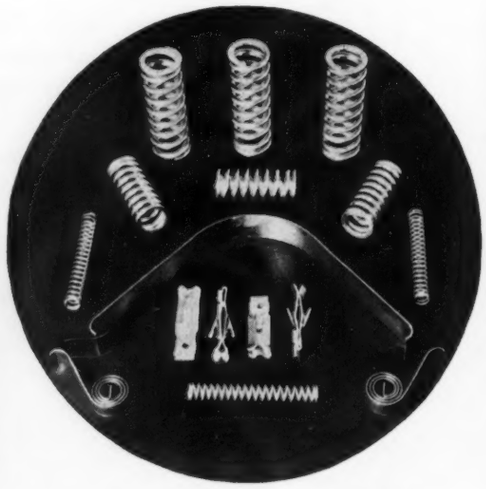
Connector of One-Piece Assembly—Compact design of "Connectite" makes taping easy. Has new nut retainer.—**Kearney.**



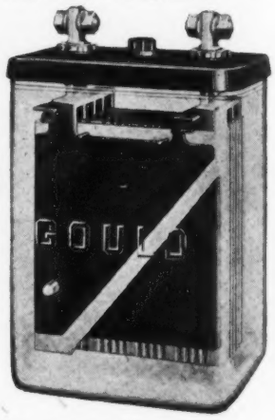
Bakelite Inclosed Range Outlet—Straight-in wiring. Solderless connections. Bottom and back knockouts with built-in cable clamp.—**Arrow-Hart & Hegeman.**

Stumble-Proof Surface Floor Duct—For existing buildings where impractical or too costly to install underfloor duct or trench and where ordinary metal molding would be stumbling hazard. Metal base and ramp-shaped cap 1¾ in. wide snap together with concealed fastenings. Accommodates two or three telephone circuits or six buzzer circuits. Fittings for connection to existing floor outlets, baseboard wiring and service outlets. "Metal Florduct."—**National Electric Products.**





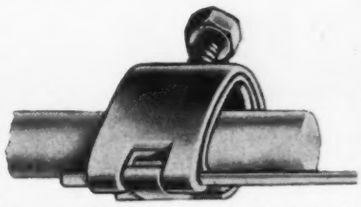
Beryllium Copper for Contacts—And for fuse clips, switch blades, vibrator arms, contact brushes, appliance plug clips, springs, etc. Added nickel enhances spring qualities.—**American Brass.**



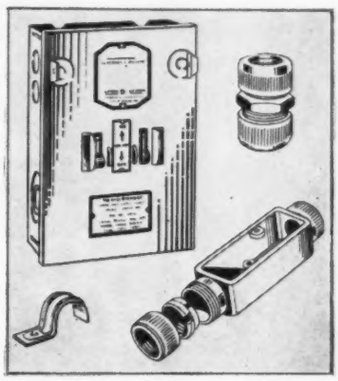
Sealed Battery—Plante-type positive, paste-type negative, cedar separators. Capacities 80 to 400 amp.-hr.—**Gould.**

NEW DEVELOPMENTS IN WIRING DEVICES

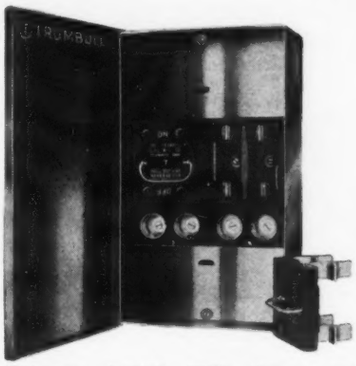
Cable - Connectors — (A) For all cables up to 2,000,000 circ. mil. (B) Accommodates two No. 6 stranded conductors or two No. 10 solid wires.—**Burndy.**



Ground Clamp—Called "Clamptite," positive pressure connection, for wide range of wire and rod sizes, slips over rods with battered heads, strap ductile.—**Kearney.**



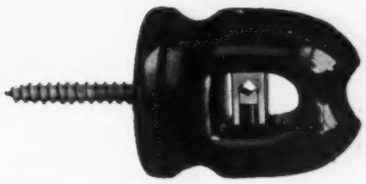
Corrosion-Resistant Conduit — Strong, durable, non-magnetic. Wide range of sizes; two wall thicknesses—"Everdur" EMT and "Everdur Rigid Conduit." Uniform temper, accurately drawn. Cut, threaded, bent similar to steel. Several complete lines of Everdur fittings.—**American Brass.**



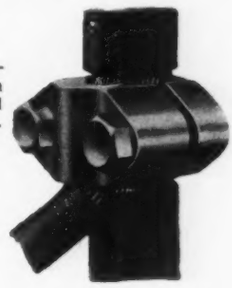
Entrance Switch With Range and Branch Cutouts — For new-sequence wiring. Two fusible dead-front, 60-amp. circuits for main and range circuits have solderless connectors; four 30-amp. lighting circuits.—**Trumbull.**

BETWEEN ENTRANCE AND APPLIANCE

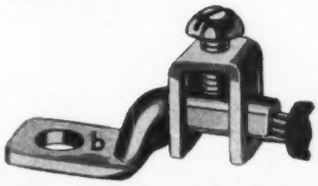
Products are legion here and those shown are only a glimpse at what has been launched to do a better job as to fuse blocks, knockout boxes, distribution systems, appliance switches, floor ducts and conduit. Lamp cords and plugs have gone definitely all rubber for safety and abrasion-resistance. For winding purposes there are wires with new forms of deposited insulation.



Bracket with Built-in Connector — After dead-ending service, its terminal and house conductor are clamped in jaws.—**Line Material.**

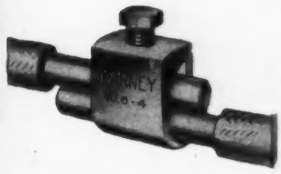


Gutter Tap— For use in cramped quarters. —**Burndy.**

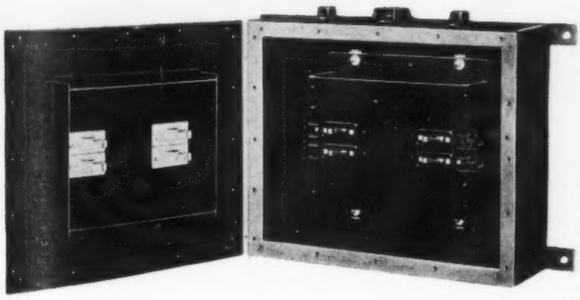


Solderless Lugs—For No. 8 to 500,000 circ.mil. One-piece, high pull-off strength, will not vibrate loose. (A) Incloses wire and has same cross section; (B) for range of sizes.—**Reliable.**

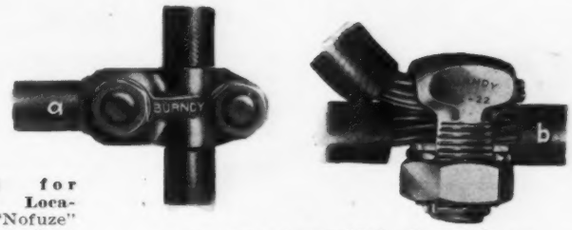
Quickly Attachable Lug—Locks permanently against vibration. Removable for reuse. For all wire and cable sizes.—**Burndy.**



Building Entrance Connector — Compact, sturdy, both wires placed in pure compression. "Connectite" made entirely of Everdur.—**Kearney.**

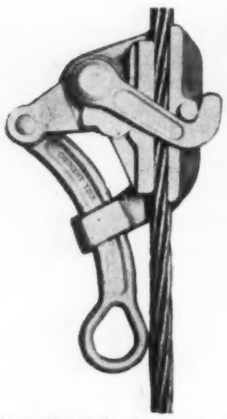


Panelboard for Hazardous Locations — "Nofuze" circuit breaker panel with a dust-tight cabinet.—**Benjamin.**



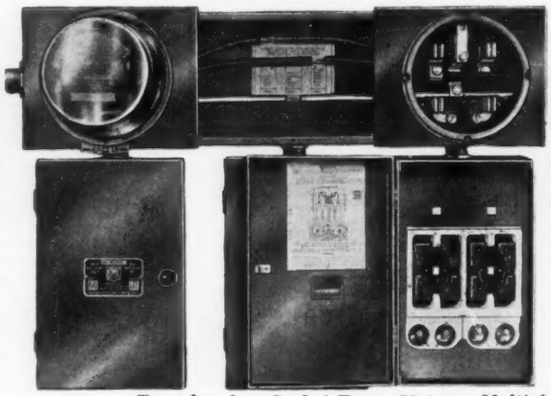
Tap Connectors—Made for cable up to 2,000,000 circ.mil. (B) Forged high-strength durium alloy—**Burndy.**

NEW DEVELOPMENTS IN WIRING DEVICES

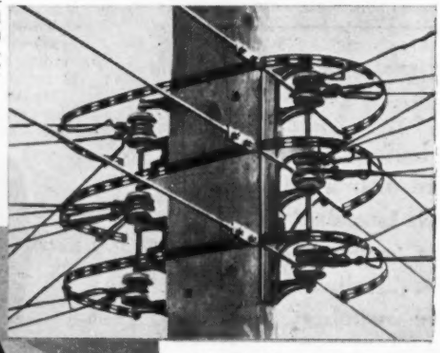


Drop-Forged Grip — For pulling wire. Will not slip; jaws always parallel; easily released. Can't drop off wire.—**Crescent Tool.**

Gutter Tap With Insulating Cover — For tapping main feed in cramped quarters. Two bronze pieces clamp over bared section of feeder and end of tap; held together with case-hardened screws. Over assembly snugly fit two halves of bakelite cover held by heavy steel spring. Note compactness of connector and ease of taping if bakelite cover is not used. —**Frankel Connector.**



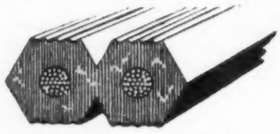
Troughs for Socket-Type Meters—Multiple indoor new-sequence installation at left for range, water heating and regular services. Weatherproof outdoor construction at right suitable where off-peak water heater is controlled by time switch and metered separately from other service. Both compact, simple to install, easy of access.—**Palmer Electric & Manufacturing.**



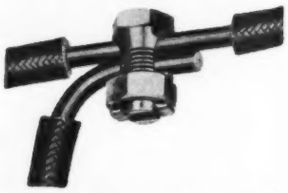
Service-Drop Connection Strap—Copper ribbon punched at 2 in. intervals accommodates "Servits."—**Burndy.**

Adjustable Water-Proof Floor Box—Leveled in rough and adjusted by screws to meet floor level. Metal gasket, sherardized finish, rubber or brass type fitting.—**National Electric Products.**

Automatic Dead-Ends—Conductor inserted in tube automatically gripped. Reduces time and cost of making dead ends and pulling slack.—**Electroline.**

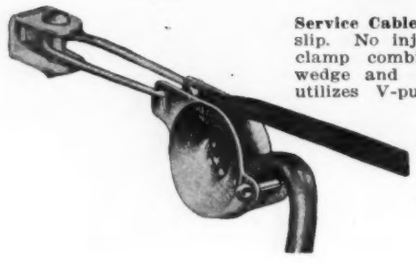


Twin Parallel Lamp Cord—Stranded, cotton wound copper conductors. Hexagonal wall of rubber insulation joins conductors. Easily separated, leaving each complete. —**Simplex Wire & Cable Co.**



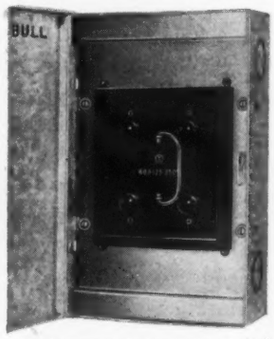
Split-Bolt Connector — High gripping strength and low resistance. Withstands vibration and severe temperature without loosening.—**Reliable.**

Heavy-Duty Unilets for Hazardous Locations—Appleton Electric makes receptacles and plugs to resist acids and fumes. High insulation, interchangeability and uniform embedding. —**Bakelite.**



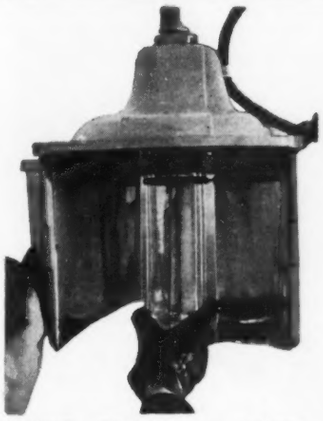
Service Cable Clamps—Two forms. No slip. No injury to braid. Dead-end clamp combines principle of snub, wedge and clamp. V-groove clamp utilizes V-pulley principle.—**Kearney.**

Two-Way Connector and Stud-Terminal Lug — Eight solderless "Handilugs" accommodate No. 14 to 1,000,000-circ.mil wire. Stud lugs for back-connected equipment also made with rectangular lug.—**Trumbull.**

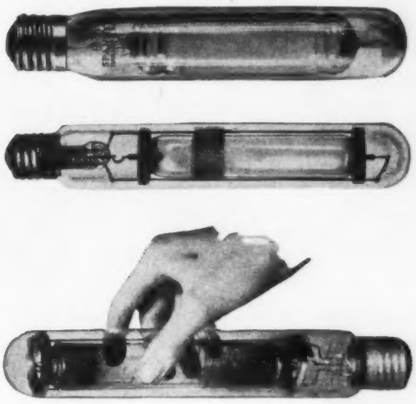


Dead-Front Entrance Switch —Pulling, turning and reinserting of dead-front pull-switch changes from "on" to "off" positions.—**Trumbull.**

NEW DEVELOPMENTS IN ILLUMINATION



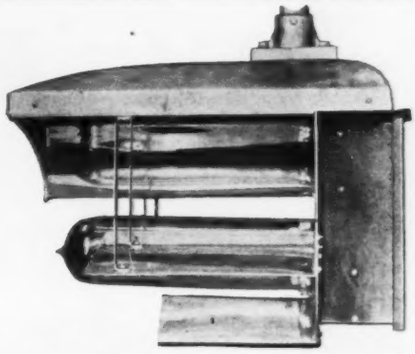
Butterfly Fixtures for Sodium Lighting — For high-intensity highway lighting. Downward, longitudinal distribution of light along roadway. — **Westinghouse Lamp.**



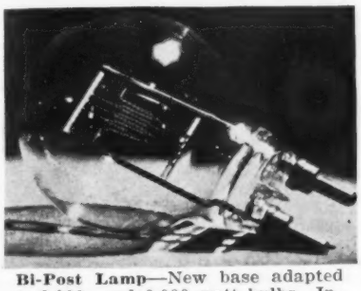
Mercury-Vapor Lamp (Top)—High efficiency, light brilliant blush-white. For multiple in 110 volts and 220 volts; for series 6.6 amp. Standard screw base. Wattages 250, 300, 400.—**Spanner.**

High-Intensity Mercury-Vapor Lamp — (Center)—110 and 220 volts, 60 cycle, 14,000 lumens at 400 watts, vertical mounting. Reduces glare and eye fatigue. —**G. E. Vapor Lamp.**

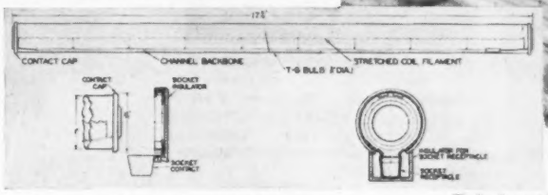
High-Efficiency Mercury-Vapor Lamp — Illumination similar to daylight when used with tungsten-filament lamps. Rated 15,000 lumens, 400 watts; 13 in. long, 2 in. diameter.—**Westinghouse Lamp.**



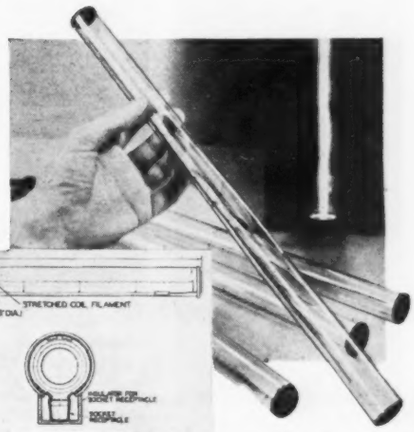
A.C. Sodium Arc Lamp and Reflector—Highway illumination. Ratings 10,000- and 6,000-lumens.—**General Electric.**



Bi-Post Lamp—New base adapted to 2,000- and 3,000-watt bulbs. Increases ruggedness and assures accurate position of light source. For motion-picture studios and airports.—**General Electric.**

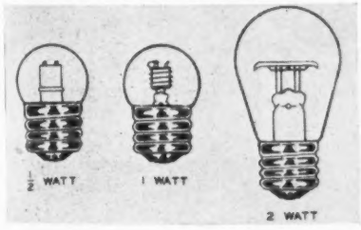


Tubular Axial Filament-Lamps—Filament terminates at contact caps. Placed end to end give line of light. Ratings 30 and 60 watts, 1,500 hours life.—**General Electric.**

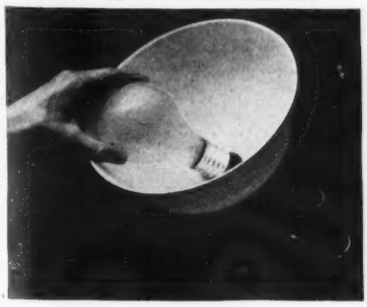


Tubular Lamp Based at Both Ends—Continuous line of light for decorative illumination. Placed end to end on 18-in. centers. Ratings 30 and 60 watts at 110 volts.—**Westinghouse Lamp.**

Neon Glow Lamps—Low consumption, long life, low brilliancy. For stroboscopic work, polarity determination indicator service. Sizes ½, 1 and 2 watts.—**Westinghouse Lamp.**



Three-Light Bulb—100- and 200-watt filaments used separately or combined for three intensities. Requires special socket. — **Westinghouse Lamp & General Electric.**

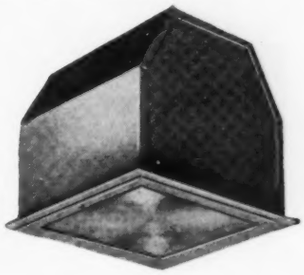


LIGHT SOURCES AND METERS

Two-filament, three-light lamps, double-based tubulars, sodium vapor, high-pressure, high-efficiency mercury vapor and its daylight blending combinations with incandescents have led among the new developments in sources. Fully as startling has been the impetus given to all lighting by the introduction of simple lay-understandable working-tool meters to show up insufficiencies. On the reflector and structure side there have been comparable advances and, likewise, among the relays for automatic control of highway and window lighting.

"Vapor-Seal" Fixtures—For locations subject to combustible dusts. Gasketed, heat-resisting glass cover. Rubber gland seal or conduit.—**Benjamin.**

Built-in Lighting Units—Integral with or applied to walls and ceiling, for localized or general illumination. "Controlens" units.—**Holophane.**



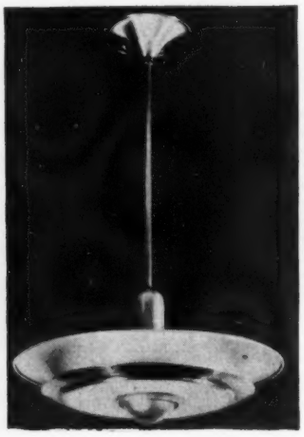
NEW DEVELOPMENTS IN ILLUMINATION

Floodlight Reflector (Left)—For short-range, wide-angle applications such as service stations, parking areas. Efficient, durable Alzak reflector.—**Electric Service Supplies.**

Reflectors Highlight "Attraction Zone" (Center)—Provide general illumination but concentrate on lower third of show window. Finishing flanges and plaster rings for recessed units.—**Curtis.**

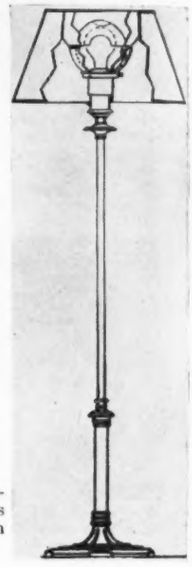
Mercury-Vapor Fixtures (Right)—For general lighting and high, narrow rooms. Concentrating and spread-type aluminum reflectors, and dome-shaped porcelain-enameled reflectors for 400-watt units.—**Benjamin.**

Variable-Intensity Indirect Unit—For optical profession. Diffused light of constant color. Essential part of light prescribing technique.—**Sight-Light.**



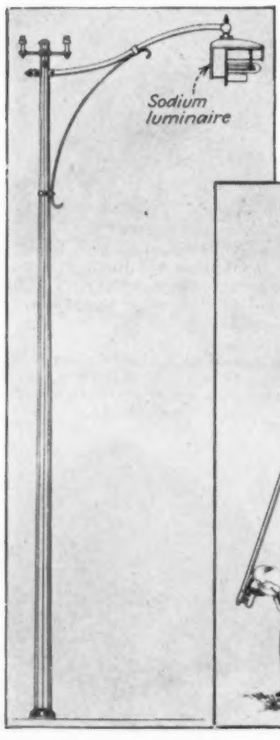
Indirect Unit With No Reflector—Utilizes silvered-bowl lamp. Luminous louver and softly lighted glass disk. Light output not affected by dust on fixture.—**Silvray.**

Indirect Portable Desk Lamp—High-level diffused illumination. Complete indirect lighting system with own ceiling.—**Sight-Light.**



Color-Correcting Portable—Uses two-filament lamp. Opal glass brightens shade. Major flux passes down through blue-glass filter.—**Sight-Light.**

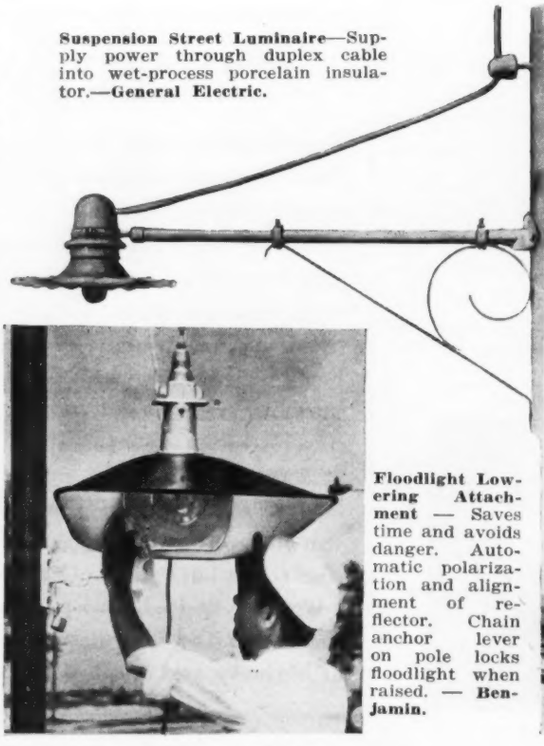
Ornamental Pole for Sodium Lamp—For highway lighting. Overhead or underground circuits. Various heights and bracket lengths.—**Union Metal.**



Hinged Tubular Poles—For flood lighting. Easy to relamp or clean reflectors. Supports 50-lb. load at 24-ft. elevation.—**Union Metal.**

Fluted Tapered Poles—For improving street appearance. Avoid termite trouble. Round poles with anchor or imbedded base for transmission, etc.—**Union Metal.**

Suspension Street Luminaire—Supply power through duplex cable into wet-process porcelain insulator.—**General Electric.**

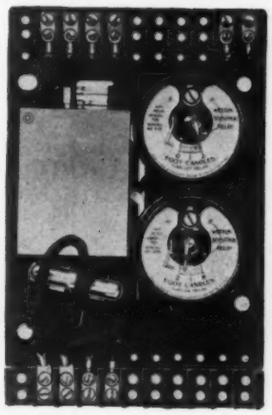


Floodlight Lowering Attachment—Saves time and avoids danger. Automatic polarization and alignment of reflector. Chain anchor lever on pole locks floodlight when raised.—**Benjamin.**

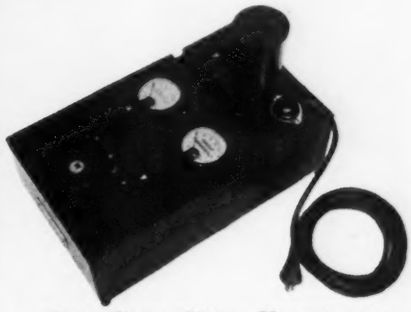
NEW DEVELOPMENTS IN ILLUMINATION

Measures Light Intensity—Photronic cell corrected to visual curve. Reads directly in foot-candles. Multiplying disk increases range to 1,000 foot-candles.—**Sight-Light.**

Light Meter with Multiplier—Translucent screen increases foot-candle range tenfold.—**Westinghouse.**



Illumination Control Relay—Turns lights on and off in accordance with predetermined light-intensity values. For industrial interiors, schools, street lights, signs, etc.—**Weston.**

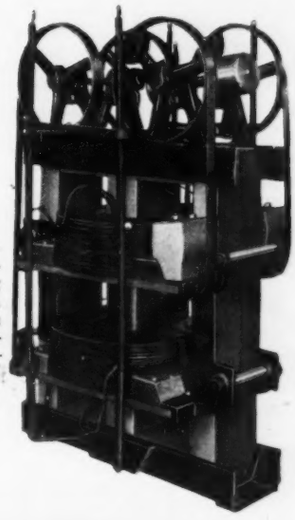


Transmittancy Meter—Measures transmission of flat, translucent material or dusty glass.—**Westinghouse.**

Doctor's Kit—Holds sight meter and seeing tasks for vision testing. Used by refractionist for near-point tests.—**Sight-Light.**

Multiple Street Lighting Relay—Several can be connected to pilot circuit. Low-resistance, non-welding contacts. Contact pressure produced by weight. Built-in arrestor.—**South Bend Current Controller.**

Sight Meter Kit—Contains "Sight Meter" and visual tasks. Promotes investigation, furnishes convincing proof.—**Sight-Light.**



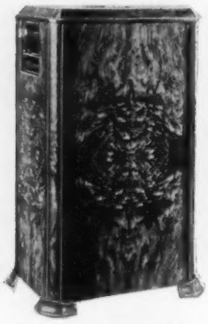
Street-Lighting Transformer—Constant current; two moving coils; ball bearings. Steel bands maintain parallelism. Close regulation, noiseless.—**Moloney.**

London Floodlighted for Jubilee Celebration—Many of the outstanding buildings and landmarks made attractive by night with judicious use of illumination. Buckingham Palace and Queen Victoria Memorial as seen from the Green Park.—**Wide World Photos.**

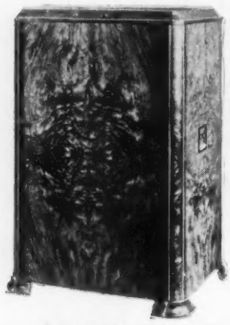
NEW DEVELOPMENTS IN AIR CONDITIONING

Small Cooling Unit—For summer cooling and dehumidification. Connects to large compressor.—**Frigidaire.**

Comfort Cooler—Dehumidifies and recirculates air for spaces up to 200 sq.ft. Requires water supply and drainage connection. — **Ilg Electric Ventilating.**

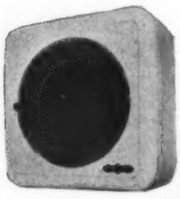


Self-Contained Air-Conditioning Unit—Operates on outside air. — **Frigidaire.**



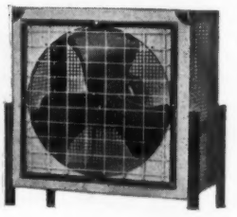
Self-Contained Air Conditioning Unit—Operates on recirculating air. — **Frigidaire.**

Portable Air Conditioner—Cools, dehumidifies and circulates air for average room. — **Westinghouse.**



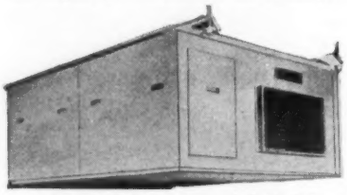
Ceiling Type Cooler—Dehumidifies and recirculates air. Uses cold water or remote Freon or methyl-chloride compressor. Adjustable deflector. —**Ilg Electric Ventilating.**

Air-Cooled Conditioner—Needs no plumbing connection. Telescopic duct connects with window.—**York Ice Machinery.**

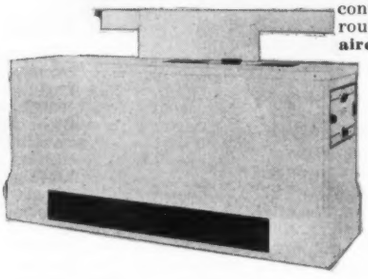


Air Circulator — Aphonic - pressure-type. In attics gives substantial reduction of sun's effect. —**General Electric.**

Commercial Air Conditioner—Horizontal type ceiling mount. Has 15-ton capacity.—**York Ice Machinery.**

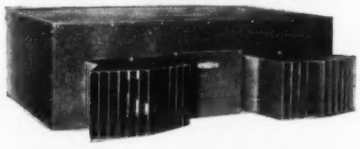


Self-Contained Commercial Refrigeration—Water or air-cooled; ¼ to 25 hp. Freon refrigerant, "centriforce" oiler. Shaft seal, minimizes friction. —**York Ice Machinery.**

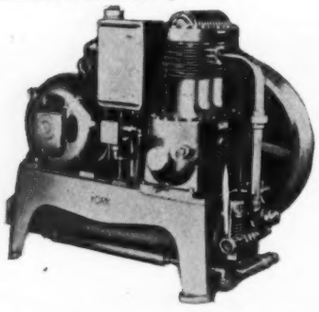


Executive Type Air Conditioner — Self-contained for year-round use.—**Frigidaire.**

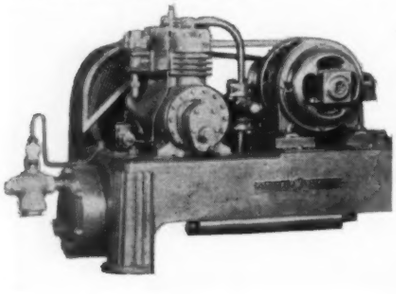
Commercial Cooling Unit—For overhead suspension. Connects to control compressor.—**Frigidaire.**



Compact Condenser for Air Conditioners — Separate water-cooled unit. Quiet, beltless. Freon refrigerant.—**Westinghouse.**

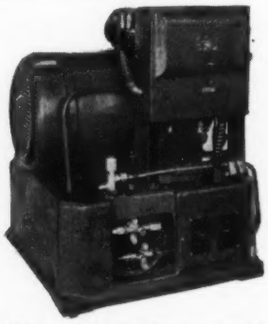


Air-Conditioning Condensing Unit — Shell - and - tube type condenser - receiver—for city water or cooling tower service.—**General Electric.**

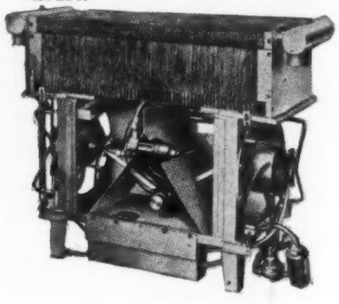


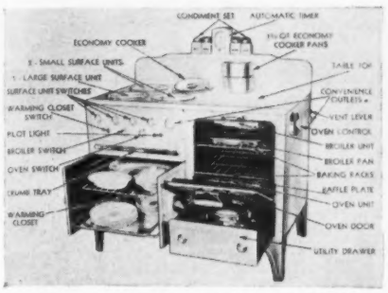
CONDITIONED AIR

The impending market for air conditioning has been a lodestone to a wide range of manufacturers. There has been an increasing number of lines and a steady progress in the development of types and sizes, particularly in commercial equipment, where the bulk of the immediate business is being found. Leading lines embrace units for both commercial and domestic service for outside air intake, for recirculating inside air and for water cooling. Much collateral fan equipment for attic ventilation, etc., has appeared, which is embraced in another section.



Unit Air-Conditioner—Cools and dehumidifies or heats and humidifies. Refrigerant from separate unit. Water-spray humidification; cold coil condensation. — **Westinghouse.**





Electric Range—Economy cooker. Pilot light. Convenience outlet. Automatic timer.—**Landers, Frary & Clark.**

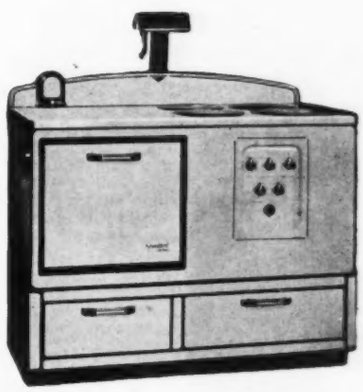
Line Leader Range—Super-insulated; optional top units, open type or high-speed "Chromalox"; cast-aluminum "sizzling steak" broiler platter.—**A-B Stove.**

Pull-Out Oven—Rolls out like filing cabinet with less heat loss.—**Walker-Pratt.**

Low-Price Range—Full size, one-piece welded body—control without relay.—**Westinghouse.**

HOME AND FARM APPLIANCES

Popular appeal of the electric kitchen idea has stimulated many improvements in equipment. Ranges with faster cooking and more durable elements, improved control, more convenience in operation and better styling; refrigerators with new touches of luxury and added utility, dishwashers built in and portable, all in a variety to suit any kitchen condition, have shown steady progress and aided the growing drive for domestic load. The laundry equipment has been no less progressive. Meanwhile, the water heater line has greatly expanded.



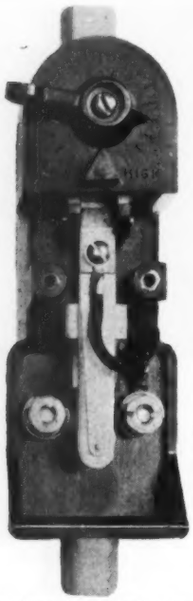
Toledoan Range—Cabinet base, two roomy utensil drawers, light.—**Standard.**

"Admiration" Range—Porcelain finish, welded frame, towel racks, light, warming oven.—**Rutenberg.**

Electric Range — Vented back wall. Automatic control. Oven temperature indicators. Pilot lamps and receptacle.—**General Electric.**

Cook-a-dor — Detachable 6-quart cooker mounted on compartment door. — **Lindemann & Hoverson.**

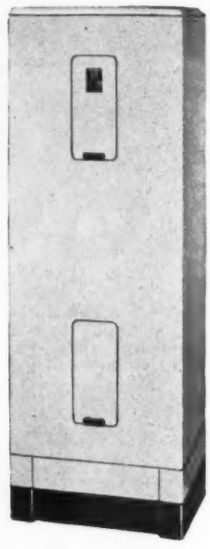
Electric Range — High-speed Calrod surface units. Dial oven control and pilot light. Smokeless broiler pan.—**Edison General Electric Appliance.**



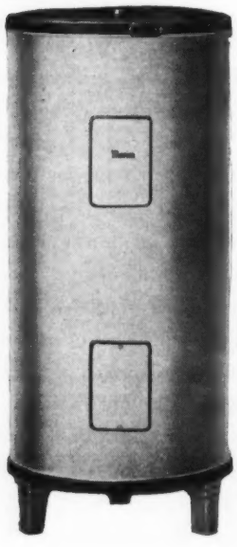
Surface-Mounted Hot-Water Control—Clamped on riser pipe; controls water temperature, limits stored heat; silver contacts, 20 amp. at 110 or 220 volts (a.c.); magnet provides snap action; range 100-200 deg. F.; 5-deg. steps. — **Struthers Dunn.**

Clothes Washers — Bar-release roll stop. Outside clutch control for agitator. Rubber-mounted heavy-duty motor. Interlocked wringer head. Vitreous enameled outside. Pump to drain if desired. Type 565, 20 gal. (working); 555, 18 gal.; 545, 16 gal.—**Nineteen Hundred Corp.**

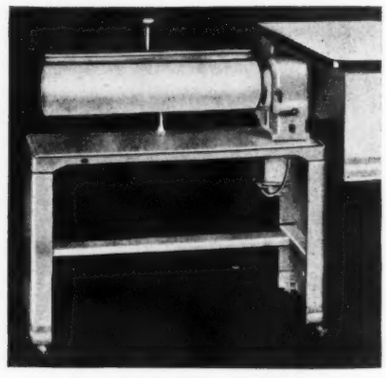
Dishwasher and Sink Unit—Oven type front door, self-cleaning, monel table top.—**Westinghouse.**



Water Heater Blends With Kitchen — 40 gal. capacity. — **Edison General Electric Appliance.**

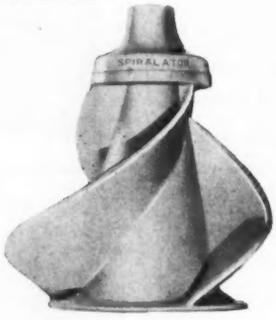


Water Heater — 30-gal. straight storage 1,500-watt bottom element, 750 top added for quick recuperation.—**Rutenberg.**



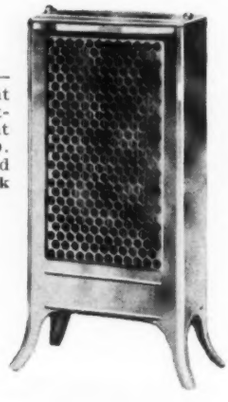
Ironer—Cabinet serves as table, knee and finger control, automatic lubrication. — **Westinghouse.**

Portable Heater — "Quikheter," 1,000, 1,250 or 1,500 watts, straight nichrome wire, automatic take-up. CR combination radiant and convection, R (above) convection.—**Frank Adam.**



Spiralator Washer — Prevents tangling of clothes and reduces former time one-third. —**Easy Washing Machine Corp.**

Water Heater — 30-gal. tank — looped hairpin element, chipless finish, adjustable automatic. — **Westinghouse.**

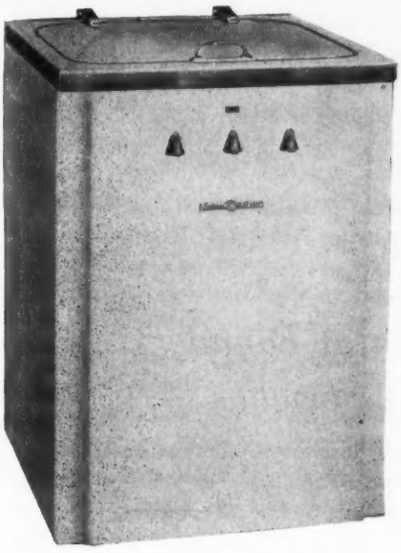


Portable Heaters — Combination radiant and convection heaters (CR) and straight convection type (R). In 1,000, 1,250 and 1,500 watts. — **Frank Adam.**

Electric Washer—Long, wide triple-vane agitator. No tub corrugations. Safety wringer release and interlocking. Pump for discharge to drain.—**Landers, Frary & Clark.**

Electric Razor-Well Insulated — Schick Shaver assembled in Bakelite molding. — **Bakelite Corp.**

NEW DEVELOPMENTS IN ELECTRIC APPLIANCES

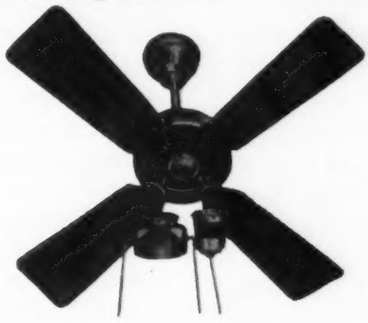


Commercial Dish-Glass Washer. — General Electric.

Shock-Proof Lamp Guard — Fiber guard, rolling rubber ring lock, no exposed live parts, no bolts, no screws.—**Safeguard.**

Fan Heater—Small fan drives air over heating coil for quickly heating bath room.—**Westinghouse.**

Ceiling Fan Improved—Separate oil cup and switch cover, adaptable to glassware, oil drained without dismantling.—**Emerson.**



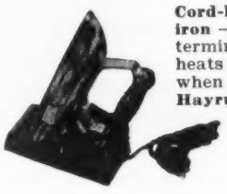
Soft-Rubber Plug — Unbreakable; smaller. Color to match supply cord. —**Belden.**

All-Rubber Cord Set — Green rubber-covered asbestos heater cord. Kinkless. Unbreakable green rubber plug-cap and Bakelite high-heat screwless heater plug. — **Arrow-Hart & Hegeman.**

Electric Clocks — For numeral time reading; quiet, self-starting motor; permanent lubrication.—**Pennwood.**

20-In. Air Circulator—4,000 c.f.m., quiet, also tall pedestal model for floor use (8½ ft.), tiltable platform, no anchoring necessary.—**Diehl.**

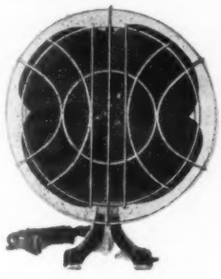
Revolving Shelf Refrigerator—With "button touch" door latch, automatic light and ice release.—**Westinghouse.**



Cord-less Flat-iron — Bakelite terminal stand heats any iron when at rest.— **Hayruss Corp.**

Cellar Drainer — Centrifugal sump pump for homes, stores, machinery pits and the farm. —**Goulds Pumps.**

Ultra-Quiet Styled Fan —Blade design eliminates wind noise and increases breeze. — **Wagner.**



Teakettle with Heat-Resistant Handle — West Bend Aluminum Company design embraces terminals. — **Bakelite Corp.**

ELECTRICAL WORLD

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Municipal Plants on P.W.A. Money

LIGHT is shed on the current status of municipal electrical projects financed with P.W.A. funds by a four-page list printed in the Congressional Record of April 29. Congressman McFarlane of Texas, having discovered that, out of several hundred applications totaling more than $600,000,000, projects completed or under construction amounted to only a few million dollars, and being greatly distressed by the discovery, called upon the P.W.A. for a list and had it put into the record.

To the earnest believer in municipal ownership the situation is no doubt disappointing, but, viewed realistically, it ought not to be surprising. Two causes seem fairly obvious. The sober-minded taxpayer has no stomach for the assumption of a debt, even when sweetened with an outright gift of federal funds, for duplicating existing satisfactory service—especially when he is by no means convinced that the venture will realize the promises of its proponents. Second, applications were made for which the outlay presumably could not be justified and which, therefore, were turned down by P.W.A.

The present list shows 377 applications. That is an average of less than one a day since the authority went into operation. Clearly there was no rush. Of these 377 one in every six was subsequently withdrawn. One in twelve was rescinded. Rejections account for 44.

Electrical projects completed or under construction number 45, with an aggregate allotment of about $25,000,000. More than half of these, however, call for additions to plant or distribution. Only seventeen call specifically for electric plants; $1,212,600 is allotted for these. That is one one-hundredth of 1 per cent of the capital invested in the power industry, municipal and private.

For 41 projects allotments approaching $15,000,000 have been made, but work has not yet been started. Thus, the total of actual grants and loans which have thus far been made is smaller than either of two recent utility bond issues.

There remains a list of 151 applications reported as being "under study." They are asking for $363,000,000. Most of them are at least a year old. Some have been pending as long as a year and a half. Under the circumstances ultimate approval of many seems doubtful.

Municipal P.W.A. projects do not, on the whole, loom large in the country's electrical landscape.

•

Co-operation of Founder Engineering Societies

AN EXPOSITORY meeting of the governing bodies of the four founder engineering societies with those of the jointly sponsored functional organizations was held this week. Engineers not intimately active in the headquarters function of their respective professional societies wonder at times what all the various joint enterprises have for scope and objective. Nevertheless, they do interpret them all as indicative of a rapidly growing integration of all engineering. In the past these mutual agencies have relied upon interlocking representation to keep their acts from crossing purposes and headed toward a common goal. Now their programs are being made even more thoroughly concordant and effective.

This meeting marked a new and highly valuable station on the march toward arrival of engineering at the level attained by the learned professions. It brought to the surface the fact that the inter-society activities are not overlapping and leave few gaps in the network needed to make engineering expressive, serviceable to the individual, helpful to industry and constructively contributory toward government. These agencies are broad enough in scope but mutually exclusive in definition to do for engineering and permit engineering to do for the rest of the nation whatever is needed now or in the immediate future. Getting all these groups and their sponsor boards together was a fruitful innovation. Those who could not be there can rest assured that furtherance of engineering is based on a plan and a purpose.

•

The Rejuvenation of Domestic Appliances

ELECTRICAL appliances for the home have passed through a subtle but a profound transition during the depression. Whereas a few years ago they were pre-eminently engineered products, built for efficiency and performance, today they are conspicuously tailored for popularity. The technical perfection is still there;

nay, it has been improved. But the dominant spirit in the industry today is to design appliances that will appeal to women and to men and to establish prices and policies that will induce normal families to buy.

There was a time when electrical men took for granted that these appliances could only be sold after slow, expensive campaigns of market education. Now, the basic idea of using electricity as a household servant is pretty well known and broadly accepted as desirable. So the need is for merchandise that will sell easily, and we have it. The competition between manufacturers today is to enrich well-built appliances with those plus values of beauty, convenience, utility and luxury that attract purchasers—streamlining, doors that open at a touch and accessories that are novel and smart. Part of all this has come because it has been hard to sell the past few years. Wits have been sharpened. But beyond that appliance marketing is maturing as an art. We have found out what makes them sell, and the selling has barely started.

•

Wheeler-Rayburn Showdown

THE Wheeler-Rayburn bill designed to socialize and destroy the utility industry will soon be ready for a vote. The hearings are concluded. The Senate committee has reported a practically unmodified bill. The House committee is soon to report, and there is more hope for a constructive House report, but the case is closed except for the votes.

It is to be hoped that the vote and the final bill will be in accord with the facts and on the merits. The case presented by the industry is unanswerable. Millions of investors protested, disaster was shown to follow this insane legislation. If the House and the Senate have the courage of their convictions the bill will not pass. But the White House "obsession" persists. The orders are out. The fate of the industry rests upon the courage and conscience of Congress to set aside the orders of one man.

Congress should see that this bill, ostensibly aimed at holding companies, is in reality destructive to operating companies and to state regulation. It is a candid attempt to set up a federal bureaucracy that will usurp all functions of private management and local regulation. It is the opening wedge toward the socialization of the utility industry. The American people look to Congress to decide the utility case in the light of the evidence.

Our greatest success and our best asset is the present utility industry in this country. All irregularities, abuses and wastes are negligible in comparison with the splendid accomplishments of private enterprise in building a national power supply. It is the envy of all countries. It excites the applause of the world. Neither Congress nor the American people wish to destroy this industry. They wish to encourage it to go forward, to keep on building and expanding, to continue the electrification of this country. If a wabbly and servile Congress votes for the Wheeler-Rayburn bill there is no question about it. We have reached a dictatorship.

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Oil Migration in Bushings

IMPROVED methods of studying the insulating integrity of bushings have enabled operating engineers to identify a number of problems associated with service maintenance. As a result there is widespread interest in the problem of oil migration in both solid and condenser type bushings. Under some conditions oil will migrate into the compound of both types of bushings and the resulting mixture may return from the bushing to the oil. The effects may be summarized as the development of high power factor, hot spots, voids, abnormal mechanical stresses, increased sludge conditions, reduced dielectric strength of oil and enhanced maintenance costs. Much remains to be learned about the conditions which produce these effects, but it is recognized that they represent serious potential hazards to continuity of service through dielectric deterioration.

Oil and compound are excellent dielectric media when used separately, but in bushing design it has not been intentional that the two should ever meet. Capillary action and vaporization contribute to migration, and it appears that capillary action plus gravity is responsible for the return trip. In many cases it has been found that the expansion and contraction of the semi-fluid exceeds that of the original compound through temperature cycles. Unequal mechanical stresses have sometimes broken gaskets and cement shields, and have apparently contributed to the cracking of porcelain rain shields. After gaskets or cement shields are broken, moisture enters more readily and tends to follow pockets or cells where these have been left by oil migration. Another hazard results from the possible transfer of carbon and other impurities from a circuit breaker or transformer tank by oil globules into the bushing compound. The unequal expansion and contraction of the oil and compound tends to cause voids, which increase in size when subjected to corona action and to destroy more and more of the surrounding dielectric.

Prevention of bushing trouble from oil migration appears to lie along the line of more adequate sealing of the lower portion of bushings in designs subject to this hazard in both solid and condenser types, in better sealing of the conductor tube in certain condenser type transformer bushings to keep out oil vapors, in the use of more rugged gasket material and, finally, in a more intensive study of the effects of oil and compound mixture by manufacturing research and operating engineers.

Senate Utility Bill Passes; House Split

New draft modifies "death sentence" — Investment trust investigation ordered — House action still in doubt — Utility executives renew attack

By a vote of 14 to 2 the Senate interstate commerce committee reported favorably last week the revised public utility holding company bill. As reported by the committee, the bill is a substitute for the original measure which was introduced in the Senate on February 8 as an Administration proposal. Although the bill in its present form contains some modifications, its provisions are regarded as most drastic.

In his report to the Senate, Chairman Wheeler analyzed, section by section, the numerous changes made by the committee in the bill. One of the most important changes of general interest is that which modifies the so-called "death sentence" provisions. This section has been rewritten to empower the Securities and Exchange Commission to extend the life of holding companies two years beyond 1940 if it deems it necessary to provide additional time to dissolve the company.

Investment trust provision

Another change in the bill directs the Federal Power Commission to make a thorough study of investment trusts and report results of these studies with recommendations to Congress by January 1, 1936. The original provision dealing with the study directed an investigation into public utility companies, but this was enlarged to cover the investment trusts. The new section says: "The commission is authorized and directed to make a study of the functions and activities of investment trusts and investment companies, the corporate structures and investment policies of such trusts and companies, the influence exerted by such trusts and companies upon companies in which they are interested and the influence exerted by interests affiliated with the management of such trusts and companies upon their investment policies and to report the results of its study and its recommendations to the Congress on or before January 1, 1936."

A further concession to those who protested that the legislation would cause dumping of a vast number of securities on the market was contained in a section permitting holding companies to retain possession of securities of non-related industries already on hand. But henceforth, utility companies cannot acquire non-related companies such as bus and street-car lines, or barge systems.

In statements issued following the Senate action, utility executives maintained that the bill retains all the destructive features of the original draft despite misleading assurances of modification.

With the subcommittees of the House interstate and foreign commerce committee still hard at work on revisions to the original draft of the Rayburn holding company bill, the extent to which the "death sentence" and other provisions of the proposed legislation will be modified remains very much in doubt.

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Passamaquoddy Project Gets $10,000,000 Allotment

Recommendation for an allotment of $10,000,000 from work-relief funds for the first year's development of the Passamaquoddy Bay tidal power project near Eastport, Maine, was made last week by the Advisory Committee on Allotments. The purpose of the project is development of cheap hydroelectric energy by harnessing the tides of the Bay of Fundy. The project, as now contemplated, differs in many respects from a larger $47,000,000 proposed private project, application for which was filed some time ago with P.W.A.

The allotment recommended last week was to the War Department Corps of Engineers, which will build the project. Ultimately it is possible to extend the project to include additional works embracing the Passamaquoddy Bay located partly in Maine and partly in New Brunswick, Canada.

The Passamaquoddy project provides for the utilization of the tidal range of a normal average tide of eighteen feet in Cobscook Bay near Eastport, Maine, for the development of power. The installation will include a power-house of initial capacity 166,670 kva., but constructed for expansion to 366,674 kva. Construction of the project will be under the supervision of Major Philip B. Fleming, U. S. Corps of Engineers.

Allotment of $20,000,000 from the $4,000,000,000 work-relief fund for construction of the Lower Colorado River Authority's power, flood control and irrigation project in Texas has been recommended on the basis of a resolution adopted by the Advisory Committee on Allotments.

President Sets Up Rural Power Unit

Rural Electrification Administration established by executive order — Cooke outlines plan — Private utility companies invited to co-operate

Under executive orders of President Roosevelt the Rural Electrification Administration has been established "to initiate, formulate, administer and supervise a program of approved projects with respect to the generation, transmission and distribution of electric energy in rural areas." From the appropriation made by the Emergency Relief Appropriation act of 1935 the sum of $75,000 was made available for the administration's immediate needs.

The executive order also provided that the administration might acquire, "by purchase or by the power of eminent domain, any real property or any interest therein and improve, develop, grant, sell, lease (with or without the privilege of purchasing) or otherwise dispose of any such property or interest therein."

Possibilities for additional revenue

Private power systems were invited to co-operate in the administration's program by Morris L. Cooke, head of the administration, who indicated that if private companies co-operated with the government in extending electricity to farmers every encouragement would be given to them to enjoy additional revenues from rural electrification. He added: "If this is not done, the government might have to form a Delaware corporation, similar to the Electric Home and Farm Authority, now prevailing in the Tennessee Valley, to carry out its plans to give the farmer the same facilities as are now enjoyed in the urban sections." He outlined four schools of thought as to how the government could best carry out its rural electrification program, as follows: (1) The government should use its money exclusively to aid private utilities in extending lines; (2) depend entirely on state and municipal agencies to develop rural extensions; (3) co-operate with co-operative concerns such as exist in many states and among farmers; (4) the government should handle the plan itself, setting up production and transmission distribution lines.

While the government's policy has not been definitely decided on, Mr. Cooke

seemed to think that co-operation with the present utilities would be adopted and that in the end this plan would probably prove the most feasible in the greater part of the country. In stating that he hoped to bring electricity to 5,000,000 more farm homes, he declared that this could be done only through cheap rates so that the farmer could use electricity not only for lighting but for power.

Appointment of Vincent D. Nicholson of the NRA legal division as counsel for the Administration was announced and of M. O. Swanson as chief engineer.

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Hawks Nest Case Dismissed

Maintaining that control of navigation by the United States may be threatened by the imminent construction of the dam, but not by permission to construct it, and that no controversy between West Virginia and the United States within the range of judicial power is disclosed, the United States Supreme Court dismissed the Hawks Nest case.

The case was brought to the Supreme Court last March when the State of West Virginia and the corporations seeking to establish this project on the New River, the Union Carbide & Carbon Corporation of New York and its subsidiaries, the Electro-Metallurgical Company and the New-Kanawha Power Company, filed motion papers seeking dismissal of the government's injunction suit against them (ELECTRICAL WORLD, March 30, page 125).

T.V.A. Rate "Yardstick" Rigged, Comptroller-General Charges

In auditing authority's accounts, J. R. McCarl makes serious accusations — Morgan denies irregularities — Norris bill passed by Senate

Findings of Comptroller-General J. R. McCarl that the Tennessee Valley Authority had overstepped its authority and rigged the yardstick by which it would measure retail electric rates were cited this week at the hearings being held before the House military affairs committee on legislation to broaden the authority's powers. The findings, made in the first official audit of the books of the authority, revealed that while plant and equipment costing $132,792,294 were transferred to the T.V.A., they were accounted for on its books at $51,000,000. The excerpts that have been made public were put into the Congressional Record by Senator Austin of Vermont.

"The nature of exceptions established," the McCarl report said, "consists of purchases without competition in violation of Section 3709, revised statutes; modification of specifications; awards on basis of personal preference; dual compensation; excessive allowances and reimbursement of traveling expenses to prospective employees; overpayment on payrolls; payment of payrolls without administrative approval. . . . Also lump sum payments under cost-plus contracts and fees without original invoices and in excess of reported progress of work; claims paid for loss and damage to property; apparent overpayments on electric equipment under annual agreements. . . . "

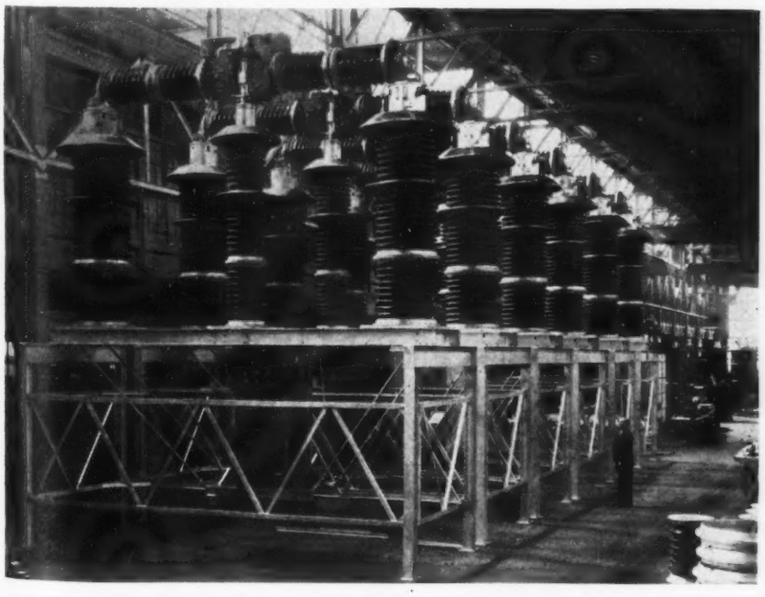
Referring to retail electric rates, the Comptroller-General's report says: "Despite the apparently excessive depreciated value at which the Muscle Shoals property was taken up on the books, the authority is not using the valuation basis for depreciation, but instead is basing depreciation on the earnings from the sale of power by charging 10 per cent of the gross revenue to operations as depreciation and accumulating the amount of such charges as a reserve for depreciation. On such basis there has been husbanded to June 30, 1934, $82,618.74. Such reserve appears to be entirely inadequate. . . . Assuming a very conservative rate of valuation consumption for example, 2 per cent, the amount of depreciation, based upon the value at which the properties in question were capitalized by the authority, would be approximately $1,000,000 per annum. A larger revenue will proportionately increase the reserve for depreciation at the present 10 per cent method of amortization, but to accumulate a reserve on the 10 per cent plan equivalent to the amount that would be charged to depreciation on a valuation basis of 2 per cent, the gross revenues would have to be more than ten times the present amount, or about $10,000,000. . . . "

Denying the accusations of dishonesty and fraud in the T.V.A., Arthur E. Morgan, chairman of the authority, asserted enemies of the program had based some of their indictments on the audit that was filled with "evidence of a lack of complete investigation" and with "improper comparisons."

Norris bill voted by Senate

Following the collapse of a filibuster, the Senate last week by a vote of 56 to 19 approved amendments to the T.V.A. law presented in a bill by Senator Norris. Without debate, the Senate adopted a significant amendment by Senator Logan to include the Cumberland River and its basin within the provisions of the T.V.A. act. An amendment by Senator Couzens making all T.V.A. expenditures conform to the "uniform system of accounting for public utilities as accepted by the Bureau of Internal Revenue" was also adopted by the Senate.

CIRCUIT BREAKERS SHIPPED TO BOULDER DAM



This circuit breaker equipment was built at the Philadelphia works of the General Electric Company for the Bureau of Power and Light, City of Los Angeles. Seven of the single-pole units are shown in the illustration. Along the 287,500-volt, 270-mile transmission line from Boulder Dam to Los Angeles there will be eight breakers, each incorporating three single poles.

N.E.M.A. Meeting Reflects Encouraging Business Outlook

Electrical manufacturers at Hot Springs conclave hear favorable reports on general business conditions — Legislation plays prominent part at sessions — Business development program adopted by directors

Four hundred electrical manufacturers gathered at the meeting of the National Electrical Manufacturers Association in Hot Springs, Va., this week. About forty sections, classified by products, met under code auspices to discuss their business activities. In addition, general meetings were held and important decisions were taken by the board of governors. General opinions were quite favorable to the business outlook, although the legislation now in Congress causes some concern.

An important new step approved was the program for business development. This is based upon at least a three-year program of education and sales promotion for electrical products and service in the residential and commercial fields. Specific projects which are to be undertaken include adequate wiring, co-operation with architects, builders and the F.H.A., contracts and service to electrical maintenance engineers, promotion and co-operation with electrical leagues, promotion of rural electrification and co-operation with other branches of the industry in sales and promotion efforts. Staff and committee organizations will be put into operation as soon as possible. It will be the object of this new activity to promote sales on a wide basis. Addresses were made at the general meetings on the status of NIRA and social and security legislation and President F. A. Jones told of the work of N.E.M.A. in recent months. Letters or briefs were presented to proper congressional authorities discussing the national labor relations act and the Wheeler-Rayburn utility bill. The legislative committees are active in rendering information service to members on local, state and national legislative matters.

Progress under NRA code reported

Among the projects and activities approved for the year are arrangement of national and area meetings, development of advisory service to sections and members, a new method of dues that is premised upon the cost of service rendered, definition of product scope, continuation of code negotiation, standardization, local codes, uniform costing and accounting, statistical service and data, the tariff and internal administrative matters. The fiscal year was changed to agree with the calendar year and budgets were approved on this basis.

Marked progress was reported in N.E.M.A. activities under the NRA code and general opinions were expressed that the experiences under code organization were on the whole constructive and valuable. Special emphasis will be put on marketing activities this year and nearly all manufacturers reported increased business this year over last year, with future prospects favorable to business in coming months.

Proposed social security legislation, the Wheeler-Rayburn bill and the uncertainty as to the future of NRA are items of concern to the electrical manufacturers and the "outside-of-meeting" sentiment reflected the general attitude that national legislative proposals were dampeners to more rapid business recovery.

Members of N.E.M.A. were rightly proud of its record under the New Deal codes and were hopeful that the good things in their code operations be retained in the future. A well-knit organization has been made and is in operation with great success. This meeting was notable for the unity and enthusiasm that now exists in the electrical manufacturing industry and for the approval of a strong and well-supported sales promotion activity. Business, as well as sentiment, reflects a very encouraging condition in electrical manufacturing.

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Los Angeles Announces Frequency Changeover

Announcement that the system of the Los Angeles Bureau of Power and Light will change over from 50 to 60 cycles upon completion of the initial installation at Boulder Dam has been made by E. F. Scattergood, chief electrical engineer and general manager of the bureau. Estimated cost of the cut-over is placed at $3,250,000, most of which will be expended on consumers' equipment.

Major work will involve changes on motors in industrial plants which are estimated to involve 50 per cent of the present equipment now served. In addition, elevators, cooling and ventilating systems and thousands of domestic electric refrigerators will be involved. Other small motor-driven machinery in homes with the exception of electric clocks will not be affected by the frequency change. Work on the changeover is to be started shortly after January 1, 1936.

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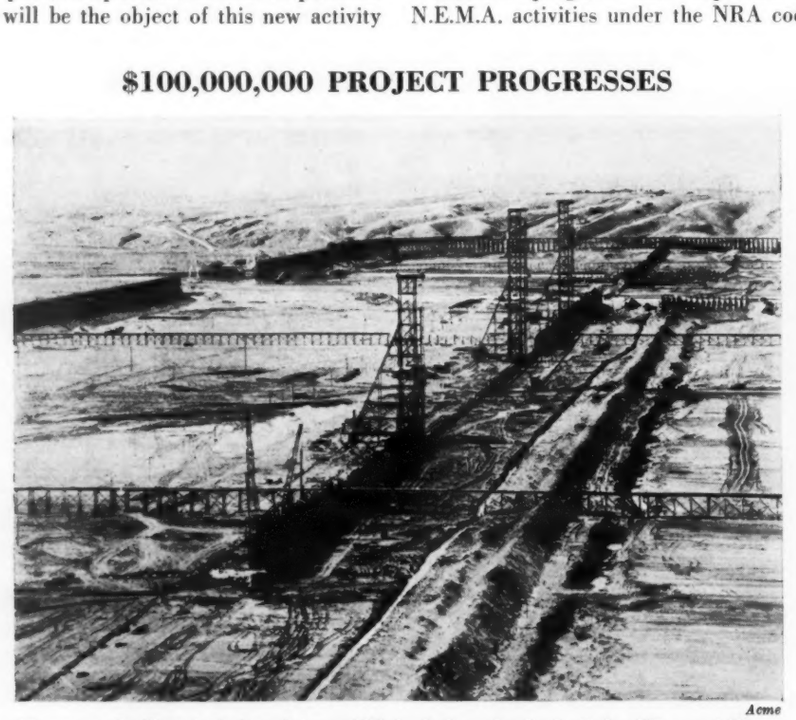
Freight Service Electrified

Announcement was made this week by the Pennsylvania Railroad of the establishment of regularly operated electrified through freight train service in the territory between New York and Washington recently equipped for electric operation by Public Works Administration financing.

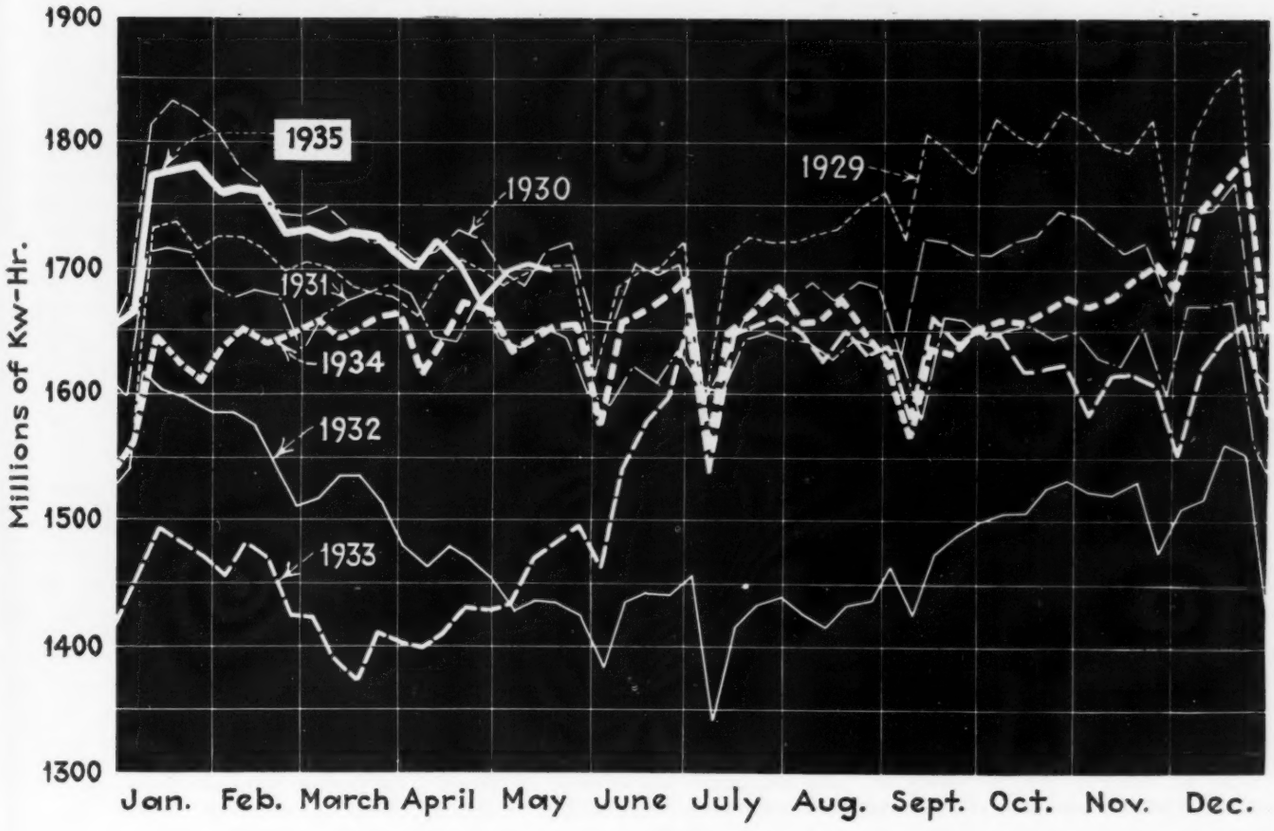
$100,000,000 PROJECT PROGRESSES



Acme

Sheet steel piling is being driven 125 ft. below the bed of the Missouri River to check seepage and prevent the gigantic Fort Peck Dam in Montana from slipping. The crest of the dam will rise 242 ft. above the line of the cut-off wall. Four years will be required to complete the project.

Output Still Up to Best Year's



Output of electric light and power companies has been conspicuously steady for nearly two months. For the first week in April, according to the Edison Electric Institute, it was 1,700,334,000 kw.-hr. The next four reports averaged very close to that figure and for the past three weeks production has remained constant at the same level, which is almost identical with the average for the corresponding periods of 1929 and 1930. During the same three weeks the lead over 1934 has ranged between 3 and 4 per cent. If account is taken of the decrease in the lighting load at this season it would appear that industrial consumption is moderately on the up-grade.

Production continues greater than a year ago in every section of the country except on the Pacific Coast, and even there an improvement is shown by the steadily diminishing disparity from 12.3 per cent five weeks ago to less than 5 per cent in the week ended May 18.

Weekly Output, Millions of Kw.-Hr.

1935	1934	1933
May 18...1,700	May 19...1,650	May 20...1,483
May 11...1,702	May 12...1,643	May 13...1,468
May 4...1,698	May 5...1,633	May 6...1,436
Apr. 27...1,673	Apr. 28...1,669	Apr. 29...1,428
Apr. 20...1,702	Apr. 21...1,673	Apr. 22...1,431
Apr. 13...1,725	Apr. 14...1,642	Apr. 15...1,410

Per Cent Change from Previous Year

Region	Week ended May 18	May 11	May 4
New England.....	+ 2.6	+ 2.2	+ 2.5
Middle Atlantic....	+ 3.3	+ 4.5	+ 5.4
Central Industrial..	+ 4.0	+ 5.1	+ 7.3
West Central.....	+ 7.2	+ 8.0	+ 5.4
Southern States....	+ 2.6	+ 3.1	+ 5.5
Rocky Mountain...	+17.6	+13.6	+13.3
Pacific Coast.....	— 4.9	— 6.0	— 9.0
United States....	+ 3.0	+ 3.5	+ 4.0

Orders and Shipments Up

Increases of 72 per cent in orders received and 51 per cent in orders shipped in the first four months of this year, over the corresponding period of last year, were announced last week by Thomas M. Hunter, president of the American Transformer Company of Newark, N. J.

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$29,500,000 Issue Proposed

Application for registration under the securities act of 1933 has been made by the Commonwealth Edison Company of Chicago of an issue of $29,500,000 of first mortgage 3¾ per cent bonds, series H, to mature April 1, 1965. Proceeds would be applied to the redemption of its $17,500,000 first mortgage 5½ per cent gold bonds, series G, due June 1, 1962, at 105 and accrued interest, and its collateral mortgage 4½ per cent gold bonds, series E, due April 1, 1960, at 102 and accrued interest.

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Canada Output Sets Record

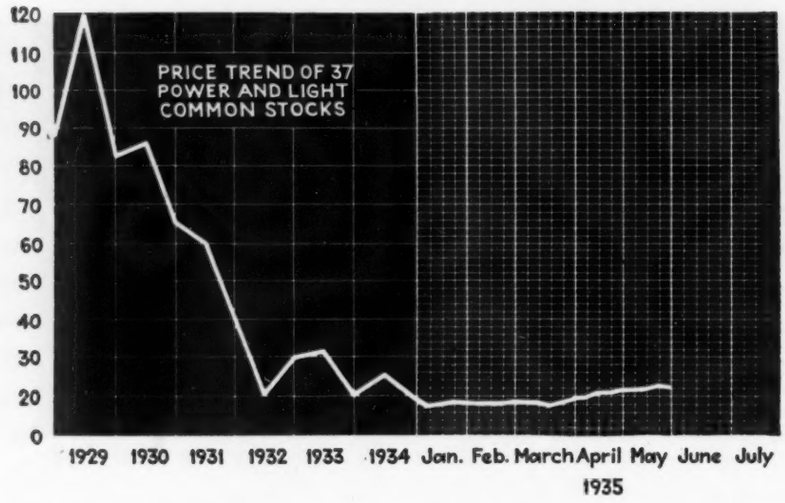
A new record for electric power production was established in Canada last year. The previous record was made in 1930 and last year's preliminary figures indicate a rise of more than 15 per cent above the previous record. Final output figures for 1930 were 18,093,000,000 kw.-hr. and the preliminary returns for 1934 showed production of 21,167,000,000 kw.-hr. In 1934 more than 94 per cent of the power produced was consumed within the Dominion, something more than 5 per cent being exported to the United States.

New York Metal Prices

	May 8, 1935 Cents per Pound	May 22, 1935 Cents per Pound
Copper, electrolytic.....	9.00*	9.00*
Lead, Am. S. & R. Price..	3.75	4.25
Antimony.....	13.00	12.75
Nickel ingot.....	35.00	35.00
Zinc, spot.....	4.575	4.525
Tin Straits.....	50.50	51.625
Aluminum, 99 per cent...	19—21	19—21

*Blue Eagle.

Utility Stocks Show Slight Change



Though some electric light and power stocks suffered a slight recession during the past week, the list as a whole maintained a fairly even strength. "Electrical World" index, 22.6; last week, 23.0.

Power Strike Victims Appeal to Governor Horner

With 41 communities affected, southern Illinois has turned to Governor Horner in an effort to end the strike of union electrical workers of the Illinois Power & Light Company. Mayors of fifteen towns at a conference held in Belleville appointed a committee which requested the Governor to arrange an immediate conference between representatives of the utility company and representatives of the International Brotherhood of Elecrical Workers. At the present time the Governor and the Illinois Commerce Commission are in consultation on the request. It is estimated that 3,000 persons employed in factories and mines are out of work because of shutdowns.

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La Guardia to Seek Loan for $45,000,000 Plant

Plans for a $45,000,000 municipal power plant to sell energy to all classes of consumers in direct competition with the Consolidated Gas System have been outlined by Mayor La Guardia of New York. In a statement issued from City Hall he announced that he would ask the Board of Estimate to give him the authority to submit the plans to the federal government and seek a P.W.A. loan. The projected power plant would be on Welfare Island, would serve about 87,000 customers in Manhattan, the Bronx, Brooklyn and Queens and would have a peak load capacity of 100,000 kw., or a little less than one-tenth of the capacity of the plants in the Consolidated system.

"In order to compensate the city for any loss of utility taxes by reason of the operation of the municipal plant," the Mayor said, "it is assumed that an amount equivalent to 15 per cent of gross revenues will be paid annually into the city treasury in lieu of taxes. This will increase the average revenue required to meet all costs from 1.97 cents per kilowatt-hour to 2.31 cents per kilowatt-hour sold. . . . A direct comparison of the 2.31 cents per kilowatt-hour required by the proposed municipal power plant and the average revenue for the individual companies shows the percentage reductions ranging from 23 per cent to 55 per cent. Compared with the weighted average revenue for all companies, the reduction would amount to more than 40 per cent. Based on total annual electric revenues of approximately $175,000,000 in New York City alone, it is apparent that a reduction in rates to meet the cost level of the proposed 'yardstick' would mean an annual saving to consumers of the order of $70,000,000, or more than the entire proposed investment in the municipal plant. . . ."

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Quebec Electric Bills Pass

Two bills introduced in the Quebec Legislative Assembly by Premier Taschereau, providing for the municipalization of electric light and power services and creating a permanent electricity commission to regulate all phases of the electric light and power industry in the Province (ELECTRICAL WORLD, April 13, page 48) were passed last week after several votes. A third measure, giving the Quebec Streams Commission certain hydro development rights, was also passed.

Current Earnings Reports

Operating Companies

	1935	1934
Alabama Power (Year to March 31)		
Gross earnings	$15,640,047	$15,632,893
Net balance	510,070	847,759
Commonwealth Edison (Year ended March 31)		
Gross earnings	76,782,501	73,670,892
Net balance	8,866,351	8,213,370
Consumers Power (Year to March 31)		
Gross earnings	29,108,120	26,443,875
Net balance	3,102,116	3,021,753
Georgia Power (Year to March 31)		
Gross earnings	22,324,840	22,285,217
Net balance	1,068,721	1,917,600
Ohio Edison (Year to March 31)		
Gross earnings	15,482,286	14,625,668
Net balance	1,483,289	1,307,588
Pennsylvania Pwr. & Lt. (Year ended March 31)		
Gross earnings	34,176,033	33,144,097
Net balance	4,884,542	5,475,792
Puget Sound Pwr. & Lt. (Year ended March 31)		
Gross earnings	13,389,876	12,707,002
Net balance	1,444,972†	1,440,775†
Public Service of No. Ill. (Year ended Mar. 31)		
Gross earnings	35 216,139	34,752,761
Net balance	2,787,731*	3,073,698*
Southern Calif. Edison (Year ended Mar. 31)		
Gross earnings	36,686,300	35,286,646
Net balance	10,822,975*	10,709,603*
Virginia Elec. & Pwr. (Year ended Mar. 31)		
Gross earnings	15,183,724	14,749,364
Net balance	1,550,711	1,656,204

Holding Companies

	1935	1934
American Gas & Elec. & subs. (Year to March 31)		
Gross earnings	$68,656,526	$64,762,552
Net balance	7,756,774	7,829,293
American Pwr. & Lt. & subs. (Year ended Feb. 28)		
Gross earnings	77,479,593	72,978,044
Net balance	4,619,114	3,624,442
Columbia Gas & Elec. & subs. (Year ended Mar. 31)		
Gross earnings	79,455,351	77,909,488
Net balance	2,466,373	5,904,631
Commonwealth & Southern & subs. (Year ended Mar. 31)		
Gross earnings	116,588,614	110,395,068
Net balance	1,235,883†	442,338†
Electric Pwr. & Lt. & subs. (Year ended Feb. 28)		
Gross earnings	75,351,212	68,351,841
Net balance	82,653	1,934,342†
National Pwr. & Lt. & subs. (Year ended Feb. 28)		
Gross earnings	71,941,839	68,866,829
Net balance	6,463,886	6,513,730
Public Service of N. J. & subs. (Year ended Mar. 31)		
Gross earnings	120,344,686	117,962,753
Net balance	24,919,538*	27,032,472*
United Gas Improvement & subs. (Year ended Mar. 31)		
Gross earnings	109,214,538	107,838,960
Net balance	27,262,070	28,468,844

*Available for all dividends. †Deficit.

Gross earnings—(Operating Companies) Gross operating revenue. (Holding Companies) Gross operating revenue plus other income. Net balance—Balance available from income for common stock dividends.

Why the Trend Toward

UNIT SUBSTATIONS?

BECAUSE USERS HAVE FOUND THAT THEY PROVIDE SUBSTANTIAL ECONOMIES, IMPROVE SERVICE RELIABILITY, AND ARE ATTRACTIVE IN APPEARANCE.

HERE are a few of the many advantages that may be gained by the use of G-E factory-assembled unit substations:

1. **SAVE SYSTEM INVESTMENT.** Their use affords important savings in equipment, real estate, buildings, taxes, and distribution feeders.
2. **CAPACITY CAN BE QUICKLY ADDED IN SMALL INCREMENTS.** Therefore, capital investment and carrying charges are added only as needed, and system planning is greatly simplified.
3. **AFFORD BETTER SERVICE.** Feeder circuits are short, giving a higher degree of service continuity.
4. **PROVIDE GREATER SAFETY.** All live parts are metal-enclosed, affording maximum safety to life and property.
5. **HAVE ATTRACTIVE APPEARANCE.** Their neat, compact design permits outdoor installations in locations where the conventional outdoor construction would be objectionable or even prohibitive.

Operating records and experience during the last five years show that G-E unit substations have given these advantages and many others. Letters from users express enthusiastic approval.

We shall be glad to discuss with you the economics of unit-substation application for your specific conditions. Send for a copy of publication GEA-2078, which we have prepared on the subject. General Electric, Schenectady, N. Y.

310-7

GENERAL ELECTRIC

Convention Program Announced by Edison Electric Institute

Carefully designed program drawn up for Atlantic City meeting—Papers to cover economic and social factors as well as engineering features—Five general sessions scheduled.

Program details for the convention of the Edison Electric Institute to be held in Atlantic City June 3-6 have just been announced. The convention program has been carefully designed to present subjects of paramount interest and value to the industry and its customers and stockholders. Maximum economy in system design consistent with adequate and reliable service, government competition in its various ramifications, the present and potential effects of political harassment of the utilities, the building and holding of good will and successful utility sales promotion in both its broad principles and its specialized applications will have predominant places on the program, together with other matters of vital importance.

Five general sessions of the convention will be open to all those who wish to attend, regardless of membership in the institute, registration at the desk being the only requirement for admission. The programs for the four sessions to be held in the daytime have been completed. The program for the Wednesday evening session, which will be featured with an address by a distinguished speaker of national reputation, has not been completed as this issue goes to press. Details of the four daytime sessions follow:

Monday, June 3, 10 A.M.—First general session will be devoted exclusively to sales and merchandising problems of the industry. Opening this session H. P. J. Steinmetz, Public Service Electric & Gas Company and chairman of the sales committee, E.E.I., will report on the activities and progress of the committee during the administrative year. C. E. Michel, sales manager Union Electric Light & Power Company, St. Louis, and G. C. Estill, president Florida Power & Light Company, will have "Sales Programs" as their general subject. Stewart McDonald, acting administrator of the Federal Housing Administration, will tell of the "Advantages to Be Gained by the Utility Through the Better Housing Program." The manufacturers' contribution to this session will be two addresses, one by P. B. Zimmerman, General Electric Company, who will discuss the "Electric Kitchen as a Load Builder," and the other by Samuel G. Hibben, Westinghouse Lamp Company, who will tell of "New Business Horizons Through Vapor Illuminants."

2.30 P.M.—Bernard F. Weadock, vice-president and managing director of the institute, will appear first at the second general session. He will give a summation of the findings of the Federal Trade Commission in its utility investigation. Frank McLaughlin, president Puget Sound Power & Light Company, will talk on "Building Good Will." J. F. Owens, president Oklahoma Gas & Electric Company, and W. H. Burke, Electric Bond & Share Company, will discuss Mr. McLaughlin's paper. N. E. Funk, vice-president Philadelphia Electric Company, will present a paper dealing with the "Effect of Service Standards of System Design," and Paul M. Downing, vice-president and general manager Pacific Gas & Electric Company; W. E. Mitchell, vice-president and general manager Georgia Power Company, and H. R. Woodrow, vice-president Brooklyn Edison Company, Inc., are scheduled to discuss Mr. Funk's paper. "Plant Modernization" is the title of a paper by Marion Penn, general manager Public Service Electric & Gas Company. This session will be concluded with a discussion of Mr. Penn's paper by A. D. Bailey, Commonwealth Edison Company; A. H. Kehoe, vice-president New York Edison Company; F. S. Clark, Edison Electric Illuminating Company of Boston, and J. M. Drabelle, Iowa Electric Light & Power Company.

Tuesday, June 4, 10 A.M.—Third general session will be featured by the presidential address of Mr. McCarter, addresses by Merle Thorpe, editor *The Nation's Business*, on New Deal policies in the field of business, and J. C. Guild, Jr., president Tennessee Electric Power Company, on the "Acceleration of Sales Programs," and the report of Frank W. Smith, chairman of the Prize Awards Committee. The awards include the Charles A. Coffin award, the H. M. Byllesby prizes, the Forbes prize, the A. L. Lindemann prizes, the Thomas W. Martin award, the James H. McGraw prizes and the George A. Hughes award.

Wednesday, June 5, 10 A.M.—Fourth general session will open with the report of the nominating committee and the election of the trustees of the institute. Frank W. Newton, chairman of the rate research committee, will present the report of his committee. "Subsidized Electric Plants" will be the subject of the address by W. H. Fuller, vice-president Byllesby Engineering & Management Corporation. Major Ezra B. Whitman, consulting engineer of Baltimore, will give an address on "T.V.A. Rates and How They Were Made" and other phases of T.V.A. activities. Hudson W. Reed, United Gas Improvement Company, as a member of a special committee has done intensive research on rural electrification and at the request of certain governmental agencies has held several discussions with them on this problem. His address will cover the basic information developed by the special committee and constitute an informal report on the conferences with the governmental agencies. H. C. Couch, president Arkansas Power & Light Company; Col. William Kelly, president Buffalo, Niagara and Eastern Power Corporation, and E. C. Easter, Alabama Power Company, have been invited to discuss Mr. Reed's paper.

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Another Clarke Suit Filed

Suit for appointment of a receiver for the Laclede Gas Light Company was filed last week in Circuit Court in St. Louis, Mo., by J. Lionberger Davis, banker and owner of $6,500 par value of stock in the company. It was charged that officers and directors of defendant company have dissipated and wasted its assets by permitting large and excessive sums to be paid out to Utilities Power & Light Corporation, the holding company. The suit names as defendants the Laclede Gas Light Company and its officers and directors, among whom is Harley L. Clarke, serving as chairman of the board of directors.

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To Revalue Power Plants in Massachusetts

Revaluation of the properties of the New England Power Company in Massachusetts, the Edison Electric Illuminating Company of Boston and power plants of other companies throughout the state will be made under the supervision of the Public Utilities Commission, Governor Curley of Massachusetts has announced following a conference with the commission and his utilities committee. By having the E.R.A. designate 500 accountants, architects and engineering experts to work under the department's supervision, the Governor said the entire cost of the revaluation project, which will take from six months to one year, will be about $100,000. If such a revaluation were undertaken privately, the cost would be in excess of $1,000,000, he said.

The Governor stated that the utilities commission was very desirous of cooperating and the power companies are also willing to co-operate to the fullest extent, with a view to justifying the sliding scale as a means of preventing confiscation either through the establishment of power plants in every community of the state or by other means. "We are hopeful," the Governor said, "that as a consequence of this work, it will be possible to secure very material reductions from present rates."

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Duke Merger Consummated

On April 30 stockholders of the Duke Power Company approved the proposal to merge the company's subsidiary, Southern Public Utilities Company, with the parent company (ELECTRICAL WORLD, April 13, page 50, and April 27, page 44). Southern Public Utilities had functioned as the retail distribution organization of the Duke Power Company. The merger simply means that the old organization has become an actual department within the Duke Power Company, carrying on the same operations as heretofore. Edward C. Marshall, who was president of Southern Public Utilities, will continue to head the retail distribution department of the Duke Power Company, of which he is vice-president. The former vice-presidents of Southern Public Utilities become heads of departments of the Duke Power Company and will perform the same duties which they have formerly performed.

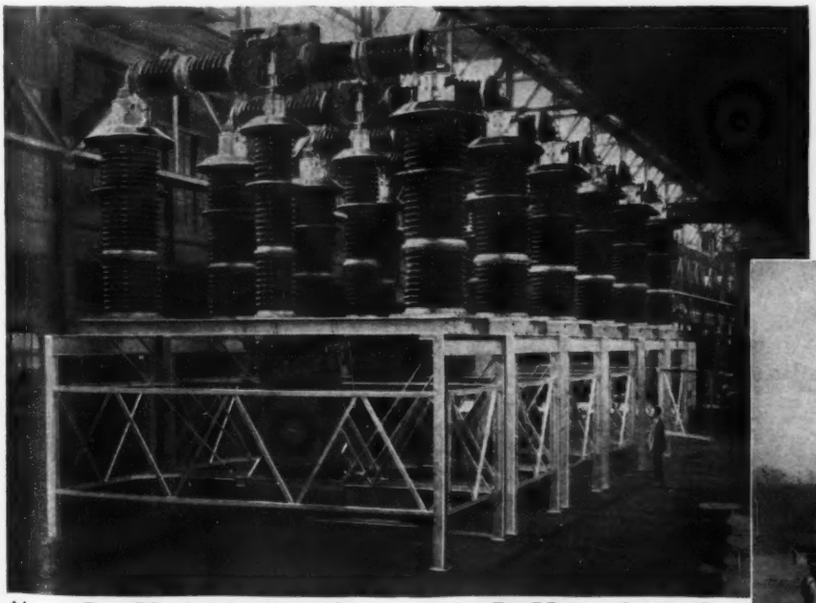
Not only circuit breakers but RECORD BREAKERS

Here's Why IMPULSE BREAKERS Have Won this Distinction

1. **They are built for the highest commercial voltage—287,500 volts**
2. **They operate at the highest speed—0.04 or 0.05 second**
3. **They have the lowest oil content—only 1/10 of the usual amount**

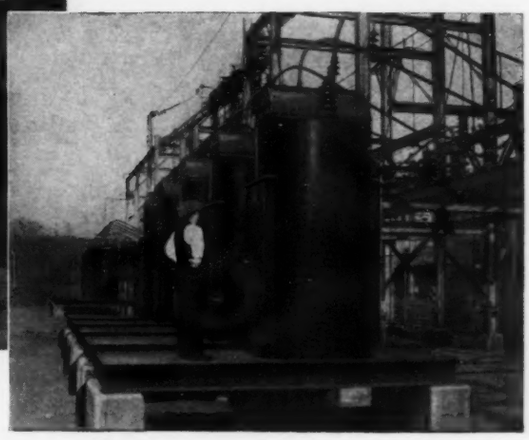
TWELVE impulse breakers are being built for the Bureau of Power and Light of the City of Los Angeles for the control and protection of the Boulder Dam—Los Angeles transmission lines. Eight will operate at 287.5 kv.—higher than any operating voltage now in use. Four will operate at 138 kv. Both have a rated operating time of three cycles (60-cycle basis) as compared with eight cycles, the fastest heretofore for high-voltage breakers of the usual type. They will improve system stability, and their exceptionally low oil content solved the complicated problem of maintenance and inspection which their installation at remote desert points presented.

Impulse breakers already have an enviable record in railway service, operating at 11,000 volts on the Reading Railway. Many are in service on the Pennsylvania's electrified line between New York and Washington, protecting the 11,000-volt trolleys.



Above—Type FG-30, 287.5-kv. impulse breakers assembled at the Philadelphia Works of the General Electric Co.

A reprint of an A.I.E.E. paper by D. C Prince, which gives a complete technical description of the circuit breakers for Boulder Dam, is available on request. Address the nearest G-E office, or General Electric, Dept. 6A-201, Schenectady, N. Y. Ask for GEA-2121.



Right—Ten FG-2, 15-kv. impulse breakers installed at the Baltimore substation of the Pennsylvania Railroad

860-3

GENERAL ELECTRIC

National Societies Hold Joint Meeting

Broader and clearer understanding of joint work established at unique meeting of national engineering societies — Employment benefits cited

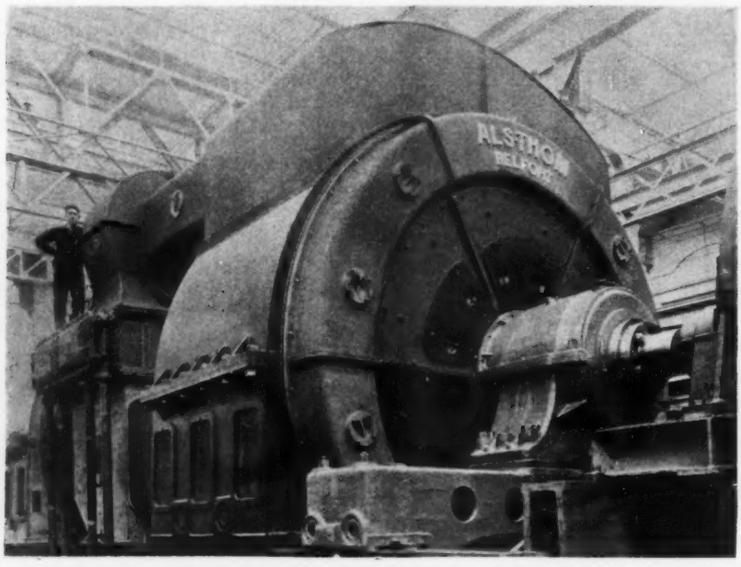
For the first time there has been held (May 20, 1935) a joint meeting of the officers and directors of the four major national engineering societies with the governing bodies of the several functional organizations sponsored by them. Each sponsored unit interpreted its functions and accomplishments for the benefit of the others and at the conclusion it was clear that there is no overlapping or manifest gap in the set-up of activities.

It was reported that an average of more than 1,200 engineers per year have been placed by the joint employment service since its institution in 1923. Harold V. Coes reported for United Engineering Trustees on the improvements made and to be made in the Engineering Societies' Building. Prof. W. I. Schlichter outlined the plan for increase in the program of lending books from the engineering library by mail to engineers all over the world, along with another plan to aid public libraries everywhere to provide better facilities for their local engineers. Engineering Foundation is initiating and guiding research as well as aiding specific projects out of its endowed funds and contributions, according to H. P. Charlesworth. Complementing it is the work of the division of engineering and industrial research of the National Research Council, which, under C. F. Kettering, vice-president General Motors Corporation, is the recognized national clearing house for industrial and governmental research.

In an address on "Industrial Prospecting," Mr. Kettering said in part: "Industry has been criticised for having several times too large a manufacturing capacity. We will never have too large a capacity until every one has the things he needs and wants. We really should say we have too few products for our factories to make. In the time just after the war we were so busy building factories to supply the products demanded by the public that we forgot that some day we would catch up with the demand. We should have been spending time developing new products for the future."

American Engineering Council speaks authoritatively at Washington for 60,000 engineers embraced in the participating national and local societies. John F. Coleman, president, said its present problem is that of the engineer in recovery, but soon it will be the stimulation of technology in the nation's backward industries. In its seventeen years the American Standards Association has become the recognized national institution in the field of industrial standardization and safety codes, with representation of all interests from producer to consumer. Newest of the joint enterprises is the Engineers' Council for Professional Development, and C. F. Hirshfeld pointed out that this group is engaging literally in what its designation implies; it is of broad and immediate service to engineers individually and collectively. Its dominant objective is the preparation of the engineer for greater and more extended usefulness to meet the demands which the social-economic trends indicate will be made upon him in the future.

A FLOATING ELECTRIC POWER PLANT



Four of these enormous motors, each rated at 40,000 hp., are installed in the new French liner *Normandie*, to propel this 75,000-ton liner at a speed of 30 knots. According to engineers of the General Electric Company, who were consultants on the job, these are the most powerful motors ever built. The motors and all auxiliary electrical equipment for the liner were built by Als-Thom, French associate of the General Electric Company. The *Normandie* is booked to make its initial voyage to America on May 29

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Legalization of Projects Sought in New Senate Bill

Drafted for the specific purpose of authorizing all projects and validating all contracts for which allotments have been made by the P.W.A. under Title II of NIRA, the Johnson bill was introduced in the Senate last week. The measure was framed in anticipation of adverse rulings by the Supreme Court, which recently upheld the State of Arizona in its controversy with the federal government over Parker Dam (ELECTRICAL WORLD, May 11, page 47).

Section I of the bill refers specifically to Parker Dam and Grand Coulee Dam, but in section II are included all projects planned or undertaken under NIRA "for the purpose of controlling floods, improving navigation . . . and for the generation of electric energy as a means of financially aiding and assisting such undertakings."

In addition to authorizing such projects and validating all contracts heretofore executed in connection therewith, the President, acting through his designated agents, is authorized by the bill "to construct, operate and maintain dams, structures, canals and incidental works necessary to such projects, and in connection therewith to make and enter into any and all necessary contracts, including contracts amendatory or supplemental to those hereby validated and ratified."

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R.C.A. to Develop Television for Home

A program involving an initial outlay of approximately $1,000,000, to be followed by other large expenditures, is to be undertaken by the Radio Corporation of America, David Sarnoff, president, told stockholders at their annual meeting this week. High definition television will be taken from the laboratory by R.C.A. for the first comprehensive field demonstration in the United States under a definitely formulated plan, according to Mr. Sarnoff. Through this plan of field demonstration "we shall seek to determine from the practical experience thus obtained the technical and program requirements of a regular television service for the home," he said.

MOLONEY
COVER TYPE BUSHING
TRANSFORMER

TO MEET the increased demand for greater insurance of continuity of service in distribution transformers for higher voltage distribution lines, the Moloney Electric Company, after a thorough analysis of operating conditions, and an actual field experience of six years, is now marketing the Type CB transformer. This type is made in all standard distribution sizes up to 50 KVA, for distribution voltages from 6,900 to 16,500 volts inclusive and is available with lead, stud or connector type secondary terminals. If desired, the horn gap arrangement shown can be furnished. This gap offers a preferential discharge path for surge voltages and protects the bushings from breakage by furnishing a horizontal arcing path free of the porcelain. The secondary neutral is coordinated thereby preventing surge voltages from entering the customer's premises.

As illustrated, this new line has through cable type high voltage bushings in the cover and stud or lead type low voltage pocket bushings.

This new design offers the same attractive features found in Moloney Power Transformers without sacrificing any of the advantages of the distribution units. The insulation has been increased, being coordinated with the flashover value of the bushings, without affecting the high all-day efficiency of the unit. Standard performance guarantees apply throughout.

The hangers can be arranged to facilitate mounting when pole space is crowded.

Many new features have been incorporated into this design to simplify four major problems of the Operating Company, installation, inspection, operation and maintenance.

MOLONEY ELECTRIC COMPANY
ST. LOUIS, MO.

British Manufacturers to Pool Technical Data

After prolonged discussions British electrical manufacturers have decided to draw up a plan under which the leading companies will pool technical information in certain branches of their production and also pool orders from certain large buyers. Although final details are not yet worked out, it is known that the plan will include the setting up of a separate central organization on which the leading companies will all be directly represented. Among the firms which are parties to the plan are the Associated Electric, General Electric, English Electric and Crompton Parkinson.

Each of these enterprises will be represented on the board of the new organization, which will receive the orders given and allocate the work involved. The object of the plan is not merely to eliminate unnecessary competition for work but to enable the buyers to satisfy their requirements more efficiently.

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Platte Valley Formulates Electric Distribution Plans

Directors of the Platte Valley Power and Irrigation (Sutherland) district in Nebraska have adopted engineers' plans for distribution lines and power houses. A high-voltage line will be built to McCook and thence east to Gage County, where it is connected with a $500,000 local development, and then to Lincoln and Omaha, to which latter point the Columbus project will also build directly east. From North Platte a 110,000-volt line will run down the Platte Valley to Kearney, with a connection 6 miles north of Hastings with the municipal plant there, and also a connection at Grand Island, with a municipal plant. The line then proceeds to Columbus to complete the synchronized network.

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Insull Pact Void, Defendant Banks Maintain

Oral argument on the testimony taken during March and April in the suit brought by holders of Insull debentures to recover $30,000,000 from five New York banks and the General Electric Company was begun last week before Judge Julian W. Mack in federal court in New York. The debenture holders have placed their hopes on the theory that they have an equitable lien or charge, similar to a chattel mortgage, on the operating utility stocks which Samuel Insull pledged with the New York banks out of the portfolio of the now bankrupt Insull Utility Investments, Inc., in 1931, and which he never was able to redeem.

The lien theory on which the present equity suit was brought is based on a covenant restricting the pledging of assets and over-borrowing, which Mr. Insull placed on the face of his investment company debentures and which the holders now charge the banks with disregarding. In a brief submitted jointly by the banks the fact was brought out that although the restrictive covenant was engraved on the face of $60,000,000 of Insull debentures, it was never legally filed under the Illinois statutes. Consequently, it is maintained by John W. Davis and other attorneys for the defense that the suit against the banks is ineffectual. At the subsequent hearings which are being continued before Judge Mack the plaintiffs argue that the bankers knew that the word debenture meant more than a mere promise to pay —that it usually limits the right of the issuer to borrow and to pledge assets.

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Condemnation Suits Upheld

Demurrers of the Southern California Edison Company, Ltd., to condemnation suits involving the company's distributing system in 36 outlying annexations to the city of Los Angeles, Calif., brought by the city and the municipal Department of Water and Power, were overruled in the county Superior Court on May 7. The suits seek to acquire by condemnation portions of the Edison company's electrical distributing systems within the city boundaries not previously acquired by purchase. The initial proceedings in the suits were filed with the California Railroad Commission in 1925, 1926 and 1927. The company has been granted until September 15 to file answers to the Superior Court actions.

COMING MEETINGS

Edison Electric Institute—Atlantic City, N. J., June 3-6. B. F. Weadock, 420 Lexington Avenue, New York.

Public Utilities Advertising Association—Annual convention, Chicago, June 9-12. Clayton G. Cassidy, Peoples Gas Light & Coke Company, 122 South Michigan Avenue, Chicago, Ill.

American Society of Mechanical Engineers—Semi-annual meeting, Cincinnati, Ohio, June 19-21. C. E. Davies, 29 West 39th Street, New York.

Associated Municipal Signal Services—Hotel Campbell, Poughkeepsie, N. Y., June 20-22. Edwin P. Cochran, secretary-treasurer, 420 Yale Avenue, New Haven, Conn.

American Institute of Electrical Engineers — Summer convention, Ithaca, N. Y., June 24-28. H. H. Henline, national secretary, 33 West 39th Street, New York.

American Society for Testing Materials—Annual meeting, Book-Cadillac Hotel, Detroit, Mich., June 24-28. R. E. Hess, assistant secretary, 260 South Broad Street, Philadelphia, Pa.

Canadian Electrical Association — Annual meeting, Algonquin Hotel, St. Andrews-by-the-Sea, N. B., June 26-28. B. C. Fairchild, secretary, 409 Power Building, Montreal, Que.

Refrigerator Sales Establish Record

Shipments of Westinghouse refrigerators in the first quarter of 1935 were double the number made in the corresponding period of 1934, reports C. S. Cosgrove, manager of household refrigeration sales of the Westinghouse Electric & Manufacturing Company.

To those seeking portents of general business recovery, he states, the electric refrigeration industry's present pace is one of the most encouraging factors in the United States today. Increased demand for units was not confined to Westinghouse, continued Mr. Cosgrove, but was also experienced by other manufacturers. Shipments made by the fourteen major refrigerator companies in the first two months of 1935 averaged more than 55 per cent higher than in January and February of last year.

"The electric refrigeration industry has proved to be 'depression proof,'" Mr. Cosgrove stated. "1934 sales equaled those made in the 'boom' period of 1928 and 1929. Even with 1934 sales amounting to nearly three-quarters of a billion dollars, the market is less than 30 per cent saturated. To the remaining 70 per cent there may be added an increasing demand for replacements, as new models outdate units purchased some years ago. Thus the existing market for refrigerators continues on a very favorable basis."

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Great Lakes Power Exposition

Plans have been formulated for a floating power show to be held June 24-28 on the Great Lakes steamer *Seeandbee*. The show, to be known as the Great Lakes Power Show and Mechanical Exposition, will be assembled in Cleveland and exhibits, arranged on the four covered decks, will be displayed in that city, Buffalo and Detroit. Power equipment, power plant materials and supplies, accessories, manufactured products in allied fields and general industrial equipment will constitute the chief items on display. Ernest H. Smith, president of the Hollow Center Packing Company, Cleveland, who has a wealth of experience in directing conventions and expositions, is managing director of the Great Lakes exposition.

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Spokane Hydro Plant

Construction of a $623,573 hydroelectric plant and dam in the Spokane river by the city of Spokane Water Department was assured recently when the Spokane City Council authorized a $500,000 bond issue to meet the city's share of the cost. Officials expect the federal government to grant $185,000 or 30 per cent of the cost of the project.

MEN OF THE INDUSTRY

G. H. Stickney Heads U. S. Committee of I.C.I.

G. H. Stickney, consulting engineer for the incandescent lamp department of General Electric Company at Nela Park, was recently elected president of the United States National Committee of the International Commission on Illumination. Mr. Stickney succeeds E. C. Crittenden, who resigned in order that the U. S. delegation to the forthcoming sessions of the International Commission on

G. H. Stickney

Illumination in Germany might be headed up by its president, Mr. Crittenden being unable to attend.

Among many high-lights in Mr. Stickney's long career there are these: Served as assistant director, illuminating laboratory of General Electric at Schenectady, 1909-1911; designed radial wave reflector for street lighting; designed first semi-indirect luminaire for incandescent lighting; fellow American Association for the Advancement of Science and American Institute of Electrical Engineers; president of the Illuminating Engineering Society, 1917-1918; secretary and treasurer U. S. National Committee, International Commission on Illumination.

"Ex-President Crittenden's seven-year administration," says Mr. Stickney, "has been eminently successful, contributing largely to international cordiality as well as to technical advances."

A delegation of ten well-known lighting authorities, led by the new president, will participate in the I.C.I. sessions, which are to be held in Berlin, July 2-5, and Karlsruhe, July 7-10.

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► DR. A. E. KENNELLY, professor emeritus of electrical engineering of Harvard University, has been elected honorary president of the United States National Committee of the International Electrotechnical Commission at a recent meeting of the committee. Dr. Kennelly has been honorary secretary of the United States National Committee for many years and has served as its adviser in international conferences abroad on many subjects. He has served with exceptional distinction on the committees on rating of electrical machinery and electrical and magnetic magnitudes and units.

► E. W. GROVER, formerly assistant superintendent of substations, Commonwealth Edison Company, Chicago, has been appointed superintendent of substations to succeed E. F. Smith, retired.

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Sir John Fleming Receives Kelvin Medal

Sir John Ambrose Fleming, well-known British electrical engineer and inventor of the thermionic tube, was recently made the recipient of the Kelvin Medal at the Institution of Civil Engineers, London. The medal is awarded triennially as a mark of distinction in engineering work or investigation of the kind with which Lord Kelvin was especially identified. The presentation was made by Sir Kingsley Wood, British Postmaster-General.

"Sir Ambrose Fleming," declared Sir Kingsley, "has been selected for the award of the Kelvin Medal on account of his great work in electrical engineering. I am gratified at the opportunity of expressing the debt which the radio industry owes to Sir Ambrose as one of the pioneers who, working under great difficulties, both physical and financial, put the science of radio in the forefront of the exact sciences and placed at the disposal of the world a means of communication of thought, sound, and now vision. It is possible through broadcasting for nation to speak to nation, and one of the greatest factors making for the peace of the world will be the drawing together of the nations through mutual knowledge of their thoughts, sentiments and actions. Sir Ambrose Fleming's numerous inventions and contributions to knowledge have earned for him recognition and appreciation by many scientific societies and other learned bodies in all parts of the world. He has now been selected for the highest engineering distinction in the United Kingdom — the award of the Kelvin Medal."

C. E. Michel Made President of Missouri Association

Charles E. Michel, sales manager of the Union Electric Light & Power Company, St. Louis, Mo., was elected president of the Missouri Association of Public Utilities at the annual meeting held recently in Kansas City. A frequent contributor to the ELECTRICAL WORLD, Mr. Michel needs no introduction to its readers. He has been sales manager of Union Electric Light & Power Company

C. E. Michel

since 1919, having affiliated himself with the organization in 1907 as manager of the electric vehicle department. Mr. Michel is a graduate of the Virginia Military Institute.

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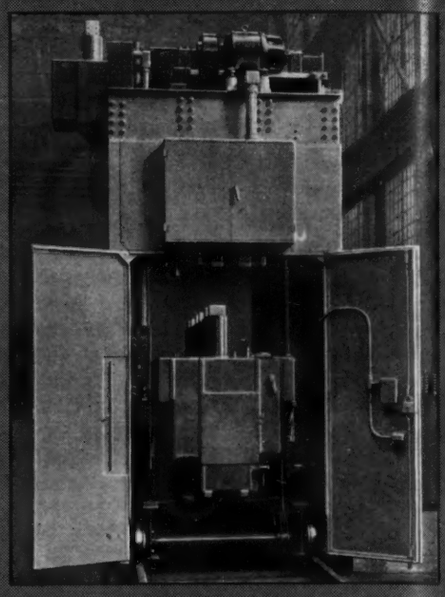
► L. V. REESE, who has been handling rural industrial communities in the rural rehabilitation program of the Federal Emergency Relief Administration, has resigned to become assistant secretary of the American Engineering Council in Washington. In his new position Mr. Reese will assist the executive secretary, Frederick M. Feiker, in carrying out the enlarged program of the American Engineering Council voted at its recent annual meeting as a service agency for relating the organized engineering professions to national affairs in the public interest. Prior to his service with federal agencies, he was engaged in the industrial, utility and construction fields.

► FRED B. CROSBY, since 1918 electrical engineer of the Morgan Construction Company, Worcester, Mass., and a member of the Association of Iron and Steel Electrical Engineers, has been elected president of the Worcester Engineering Society for 1935-36. He is a past-secretary of the local A.I.E.E. section.

(Continued on page 135)

POWER GENERATION



SWITCHING

A Broad Service

ALLIS-CHALMERS A-C MILWAUKEE

PRODUCTS FOR THE ELECTRICAL INDUSTRY

STEAM TURBINE AND GENERATOR UNITS

HYDRAULIC TURBINES AND AUXILIARIES

STEAM ENGINE—GENERATING UNITS

GENERATORS—AC and DC Water Wheel, Umbrella, Belted, Coupled, Engine, and Turbo Types.

STEAM CONDENSERS

SWITCHGEAR—Reyrolle Armorclad Type - Circuit Breakers - Switchboards and Control - Generator Voltage Regulators - Synchronizers.

TRANSFORMERS—Power Transformers - Tap Changing Under Load Equipment - Regulating Transformers - Automatic Voltage Regulators - Distribution, Network, Vault, Subway, Rural Type, Instrument and Metering Transformers.

CONVERSION EQUIPMENT—Frequency Changers - Motor Generator Sets - Mercury Arc Power Rectifiers - Synchronous Converters.

SYNCHRONOUS CONDENSERS

ELECTRIC RAILWAY EQUIPMENT

ELECTRIC MOTORS

• • •

Blowers and Compressors - Pumping Equipment - Texrope V-Belt Drives - Wheel and Track Type Tractors - Industrial Machinery.

Moreland to Continue Engineering Practice

In connection with the announcement of the appointment of Edward L. Moreland as head of the department of electrical engineering at the Massachusetts Institute of Technology (ELECTRICAL WORLD, April 13, page 70) inadvertent omission was made of the plans of Professor Moreland to continue consulting engineering practice as senior partner of the firm of Jackson & Moreland, Boston, Mass. In announcing the M.I.T. appointment President Karl T. Compton of the institute stated that the new director of electrical engineering activities would combine educational and consulting duties with advantage to both.

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▶ CHARLES EDISON, president of Thomas A. Edison Industries, has been appointed by President Roosevelt to temporary membership on the National Industrial Recovery Board.

▶ O. L. RIGGS, formerly assistant superintendent, has become superintendent of distribution in the electric department of the Lynn Gas & Electric Company, Lynn, Mass.

▶ J. D. UNDERHILL has been made vice-president of the Okonite Company, the Okonite-Callender Company and Hazard Insulated Wire Works, with headquarters in New York. Until recently Mr. Underhill was sales manager.

▶ JOSEPH C. JONES has associated himself with Sanderson & Porter, consulting engineers of New York. Mr. Jones was with Ford, Bacon & Davis until last March and formerly was associated with Thomas E. Murray, Inc., in both cases engaging in furthering their activities in connection with industrial and public utilities works. He will be similarly engaged with Sanderson & Porter.

▶ S. W. FORDYCE has been appointed director of the newly organized industrial department of the Arkansas Power & Light Company, with headquarters in Pine Bluff. Mr. Fordyce served as assistant to the general manager of the Arkansas utility for a number of years, and later as assistant to the general manager of the Mississippi Power & Light Company. He left the power companies several years ago to engage in the banking business in St. Louis.

▶ C. G. MORLEY NEW has been appointed British Electricity Commissioner to succeed T. P. Wilmshurst, who will complete his term of office next July. Mr. New is electrical engineer to the city of Cardiff and a member of the council of the Institution of Electrical Engineers. He is a past-president of the Incorporated Municipal Electrical Association and deputy chairman of the

COMMONWEALTH EDISON COMPANY'S sales of electricity in 1934 totaled almost three and one-half billion kilowatt hours —an increase of 1,030 per cent., since 1908.

•

During the same period, while Chicago's population increased 56.5 per cent., the number of our customers increased 1,002 per cent.

•

COMMONWEALTH EDISON COMPANY

EDISON BUILDING, 72 W. ADAMS ST., CHICAGO, ILLINOIS

THREE • • • IMPORTANT BELL FEATURES

GREATER STRENGTH—

—because of growth density.

GREATER SHOCK RESISTANCE—

—because of compact fibre structure.

LONGER SERVICE EXPECTANCY—

—because of thinner sapwood in proportion to total cubical volume and its greater proportion of naturally toxic heartwood.

The high altitude areas of the Selkirk Range of the Western Rockies furnish the close grained, strong and straight Bell poles. These are the same poles that have met the test of many years use under every type of service condition throughout this country and Canada.

This organization is able to fully control quality because Bell handles every step in production and manufacturing from the time the poles leave the Bell owned timber lands. The net result is that Bell poles average 23.9 per cent greater strength than specification requirements.

Bell quality is important to you today because of the opportunity it presents for economy in line construction. Consider too that the great Bell pole strength increases to a very emphatic degree the all-important "factor of safety."

Bell's "Long Span" High Altitude Western Red Cedar Poles are creosote butt treated to any specification. In consideration of economy and satisfaction put your requirements up to us. One of our representatives will be glad to confer with you.

"BELL SHIPS GUARANTEED POLES QUICKER"

BELL LUMBER AND POLE COMPANY

New Address—Phoenix Bldg.

MINNEAPOLIS, MINNESOTA

National Consultative Committee of the electricity supply industry. He has also been a member of the Council of the Electrical Research Association and of the Electrical Development Association. Mr. Wilmshurst has been a member of the British Electricity Commission since 1926.

▶ R. C. GRAVES, formerly manager of the switchboard department of the Trumbull Electric Manufacturing Company, Plainville, Conn., has been appointed director of sales. L. L. BRASTOW, formerly sales manager, was made director of sales promotion, and R. C. LIPPS, formerly assistant to Mr. Graves, was appointed manager of switchboard sales.

▶ JOSEPH A. FOWLER, of Memphis, head of the Fowler Electric Company, and long prominent in the Tennessee Electragists association work, is the new NRA compliance director for Tennessee. Mr. Fowler formerly was vice-chairman of the Memphis compliance board and district chairman of the divisional code authority of electrical contractors.

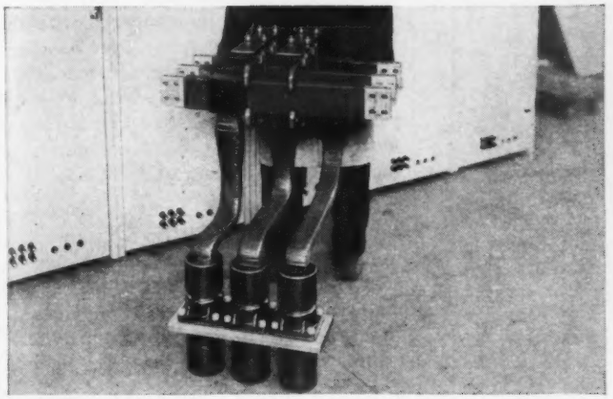
▶ WILLIAM PERRY FISKE, district sales representative on lighting and power for the Edison Electric Illuminating Company of Boston, retired from active service on May 1. He entered the employ of the company in 1897 and at one time was secretary to former General Superintendent W. H. Atkins. Mr. Fiske has been active in the Illuminating Engineering Society for many years.

▶ O. V. P. STOUT, formerly head of the University of Nebraska school of engineering, who has been representing the federal government in irrigation investigations in California, has been assigned by the federal reclamation board to take charge of the $50,000 survey of further power and irrigation possibilities on the Platte and North Platte rivers and the North and Middle Loup rivers in Nebraska.

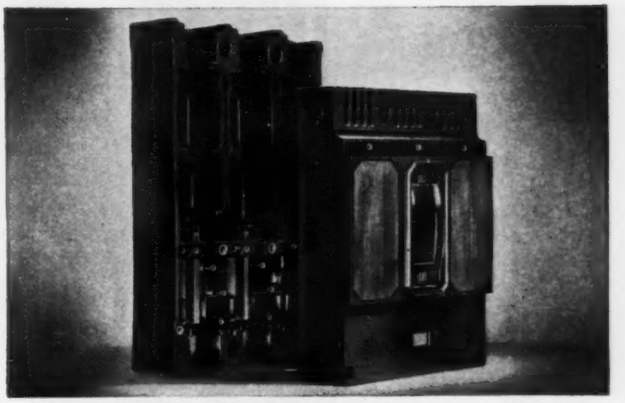
▶ C. M. GLIDDEN, formerly illuminating engineer of the Associated Gas & Electric Company system, with headquarters at Cambridge, Mass., and later at Portsmouth, N. H., has joined the engineering staff of the Public Service Commission of New Hampshire in connection with rural electrification survey activities. His headquarters are at Concord, N. H.

▶ G. N. HARRIS and J. G. GREEN, formerly connected with the Westinghouse Electric & Manufacturing Company, and HENRY HARRIS, formerly president of the United Electric Light Company of Wilmerding, Pa., have formed a corporation, the Harris-Green Company, with headquarters in Pittsburgh. They will sell motors, transformers and other electrical equipment. G. N. Harris became identified with the United Electric Light Company following graduation from Yale

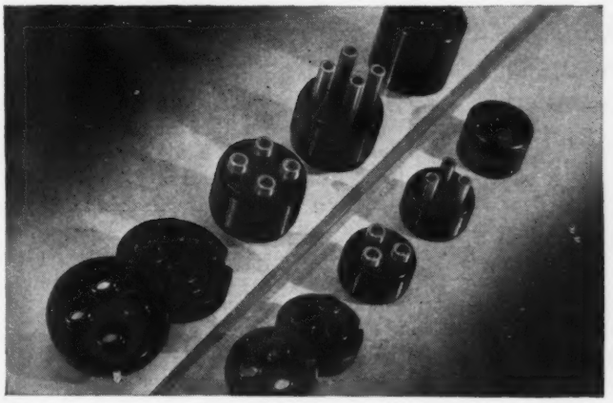
Four Examples of Modernization
with Bakelite Materials



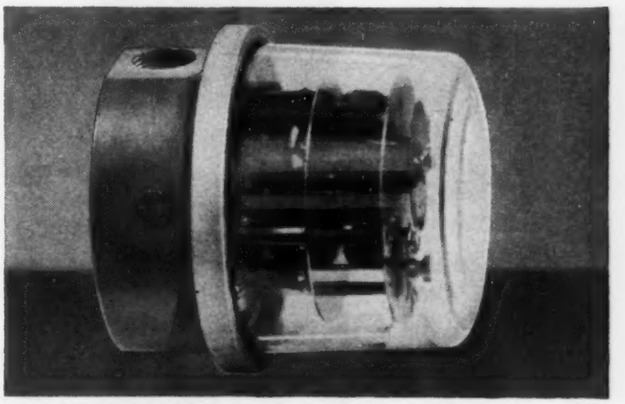
SWITCHGEARS. Insulators for the Delta Star Metal-Clad Switchgear were subjected to a breakdown test of 35,000 volts for a duration of one minute. Of the 366 Bakelite Insulators tested, only two failed—one at 33,000 volts and one at 29,000 volts. Insulators of another make and type of material were subjected to the same test and of the 133 tested nine failed. These tests provide a clear demonstration of the superiority of Bakelite Insulations for this class of service.



CIRCUIT BREAKERS. ITELITE circuit breakers are completely housed in Bakelite Molded cases. The rear section, is formed in one piece with all necessary lugs, bosses, channels, recesses, through holes, and partitions molded in. Threaded metal inserts for mounting electrical parts and for terminals are firmly embedded in the molding operation. The dielectric strength of Bakelite Molded simplified the insulation problem and provided a "dead front" for the devices.



HEAVY DUTY RECEPTACLES. Appleton armor-clad, heavy duty, "explosion-proof, dead-end" Unilet receptacles and plugs required molded insulation parts of the most substantial and durable insulation material available. After being subjected to rigorous tests Bakelite Molded was selected. In addition to high insulation value and physical strength, Bakelite Molded provided other advantages. Close dimensions were assured and consequently complete interchangeability made certain.



TIME CONTROLS. "Mount it anywhere", the makers tell purchasers of the new Paragon Time Controls. One reason this is possible is the use of Bakelite Molded for insulation parts. Terminal blocks, socket mountings, switches and base insulators have the high resistance to moisture and extremes of heat and cold for which Bakelite Molded is known. Besides providing thoroughly dependable insulation Bakelite Molded also aided in attaining compact design and economical production.

THESE ARE but four examples of the many new designs of electrical apparatus and devices in which valuable improvements have been effected through the use of Bakelite Materials. Electrical engineers and manufacturers will find much helpful information about a variety of Bakelite Materials in Booklets 3 M, "Bakelite Molded", 3 L, "Bakelite Laminated" and 3 V, "Bakelite Varnish". Your request will bring copies promptly.

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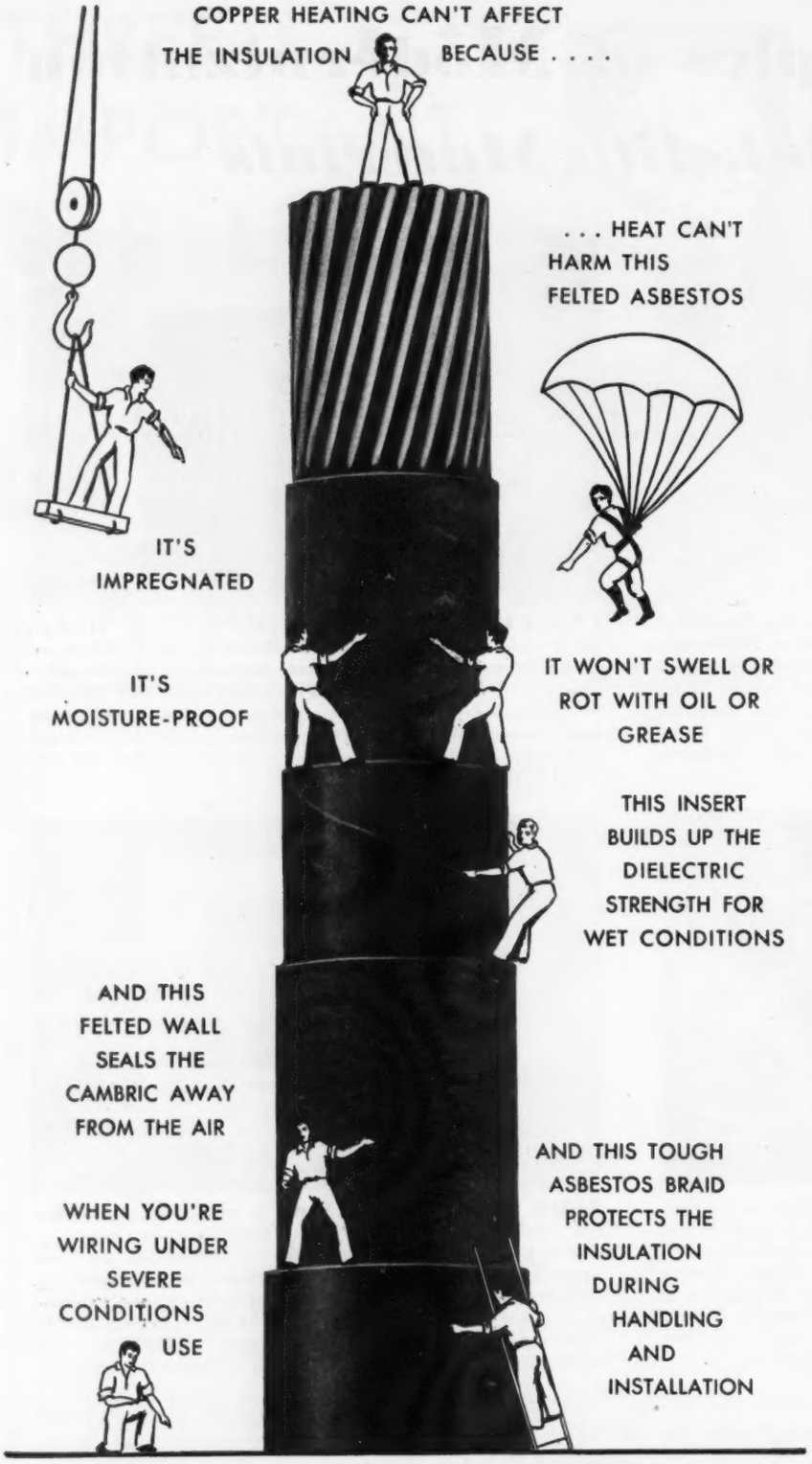
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario, Canada

BAKELITE

REGISTERED U. S. PAT. OFF.

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the numeral sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

THE MATERIAL OF A THOUSAND USES


COPPER HEATING CAN'T AFFECT
THE INSULATION BECAUSE . . . .
. . . HEAT CAN'T HARM THIS FELTED ASBESTOS
IT'S IMPREGNATED
IT'S MOISTURE-PROOF
IT WON'T SWELL OR ROT WITH OIL OR GREASE
THIS INSERT BUILDS UP THE DIELECTRIC STRENGTH FOR WET CONDITIONS
AND THIS FELTED WALL SEALS THE CAMBRIC AWAY FROM THE AIR
AND THIS TOUGH ASBESTOS BRAID PROTECTS THE INSULATION DURING HANDLING AND INSTALLATION
WHEN YOU'RE WIRING UNDER SEVERE CONDITIONS USE

ROCKBESTOS

—the wire with permanent insulation

ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN CONNECTICUT

University in 1925 and in 1929 joined Westinghouse in the Pittsburgh sales office. Mr. Green became associated with Westinghouse in 1927 and in 1933 was made manager of the general industrial and resale sections in Pittsburgh. Henry Harris organized the United Electric Light Company in 1902, remaining president until 1927, when it was purchased by and merged with the Duquesne Light Company. He has been retired from active business since 1927. He is a past-president of the Pennsylvania Electric Association and a former member of the executive committee of the National Electric Light Association.

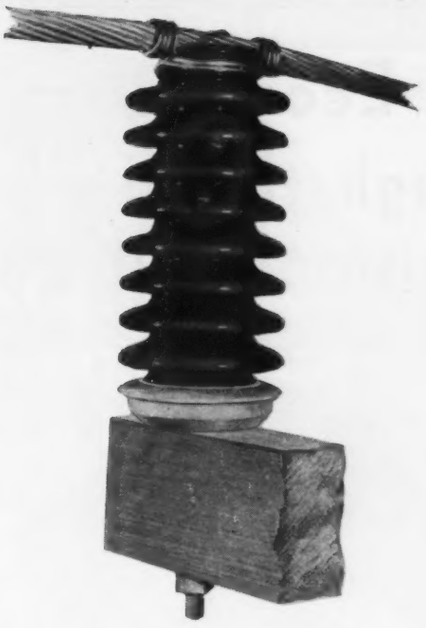
► E. W. HENDERSON, formerly associated with the Reliance Electric & Engineering Company of Cleveland as engineer in charge of a. c. motor design, is now motor design engineer for the Canadian Crocker-Wheeler Company at St. Catharines, Ont.

► A. H. SNYDER, for many years designing engineer of the Gould Storage Battery Corporation at Depew, N. Y., has recently been advanced to the position of research and development engineer for the company. In this capacity he will devote his entire time to fundamental problems relating to storage battery projects, design and manufacture.

► FRED C. TAYLOR has been appointed superintendent of production in charge of operation, maintenance and inspection of power stations, Diesel stations and substations for the El Paso Electric Company, El Paso, Tex. Mr. Taylor has been associated with the El Paso utility since last November. He has been connected with the Stone & Webster organization many years and has had a wide experience both with operating companies and on construction work.

► E. F. SMITH, superintendent of substations, Commonwealth Edison Company, Chicago, has retired after 41 years of service. He was a pioneer in operating procedure and safety practice in electrical substation work, with which he became identified early in his career, when the substation system of distribution was adopted in Chicago. Mr. Smith served on many technical committees of the company and of the societies of which he is a member.

► FRANK T. HITCHCOCK, head of the purchasing and inter-service bureau of the Edison Electric Illuminating Company of Boston since June, 1929, will retire from duty with that organization on July 1. Mr. Hitchcock was formerly vice-president of the Metropolitan Coal Company, Boston, and entered the Boston Edison company's employ in 1926 as assistant purchasing agent. Sidney Hosmer, vice-president and general manager of the Edison company, will become acting head of the bureau upon Mr. Hitchcock's retirement.



The Station Post shown above is a parallel development with the Line Post. It is a most attractive unit for outdoor substations. Investigate!

THE LAPP LINE POST

THE Line Post reduces insulator design to its fundamentals—a single piece of porcelain cemented into a malleable iron base.

THERE is no pin or other conductive material within the insulator and as a result the charging current is low and the point of radio interference starting is high. Puncture becomes practically impossible.

THE Fog Type leakage surface assures ability to handle contaminated atmospheric conditions and the short, sturdy petticoats protect the body from damage under power arcover and the attacks of stones and bullets.

ALL attachments are external, eliminating thermal bursting forces from within and assuring long, trouble-free life.

THE Line Post provides the things YOU have always wanted from pin type insulators. Let us tell you about it. Ask for Bulletin No. 112.

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INSULATORS

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In terms of Economy— big enough to fill an Exhibition Hall

"Grips like a vise"

approved by Underwriters Laboratories Pat.

FARGO UNIT CONNECTORS

You'll save time and money by using Fargo Unit Connectors. Each one "grips like a vise." There are many types of jaws available, as well as—the Hot Line Tap, the "T" Connector, the Jumper, and the Ground Clamp. A sample is readily available from your representative of the Line Material Company, South Milwaukee, Wis. —get one—test it—and be convinced.

FARGO MFG. COMPANY
Poughkeepsie, N. Y.

Money Saving FEATURES

1. Inexpensive to install—simply hook over the wire and tighten.
2. Unlimited in life — no distortion when pressure is applied.
3. Fabricated of EVERDUR —with Fargo Bolts.
4. Made with one standard bolt head on six sizes—two (smallest) sizes may be set up with a screw driver or wrench.
5. The original One-piece Connector—with unusual flexibility to wire sizes.
6. Impossible to cross thread.
7. Repeatedly serviceable.

OBITUARY

▶ ALFRED E. HAMMER, president and general manager of the Malleable Iron Fittings Company, maker of special line material, Branford, Conn., died in that city May 9, from heart trouble, after a two months' illness. His brother, V. T. Hammer, who was also identified with the company, died a month ago.

▶ GEORGE W. CRAWFORD, who served as chairman of the board of directors of the Columbia Gas & Electric Corporation from the date of its formation, died April 6. Mr. Crawford's life-time service in the public utility industry, particularly in the natural gas field, extended over half a century and was largely devoted to the building up of companies which subsequently became part of the Columbia System.

▶ GEORGE W. PERRY, secretary and assistant general counsel of the Cleveland Electric Illuminating Company, died, of pneumonia, at St. Luke's Hospital, Cleveland, Ohio, May 5, at the age of 43. He became assistant general counsel of the company in 1925 and was made secretary in 1933. Prior to his affiliation with the Cleveland utility, he served as assistant law director of Cleveland and for a time practiced law in Warren, Ohio.

▶ DWIGHT PORTER, professor of hydraulic engineering at the Massachusetts Institute of Technology until his retirement in 1921, died at his home in Malden, Mass., February 26 in his eightieth year. Following his graduation from the Sheffield Scientific School of Yale University in 1880, he entered the federal service during the taking of the tenth census of the United States and reported the water-power resources in various parts of the country. He was a member of the M.I.T. faculty for 40 years. Professor Porter was a member of the Society for the Promotion of Engineering Education and of other technical societies.

▶ CHARLES N. BLACK, director of the engineering firm of Ford, Bacon & Davis, Inc., and formerly manager of its New York City office, died in San Francisco, Calif., May 15, after a six weeks' illness. He was 68 years old, was a native of New York City and had lived in San Francisco since 1922. Mr. Black had been associated with Ford, Bacon & Davis since 1899. When he entered the employ of that organization it was engaged in constructing and managing electric street railways, and Mr. Black soon assumed executive duties on various properties. From 1922 to 1925 he was president of the Market Street Railway.

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SALES AGENTS

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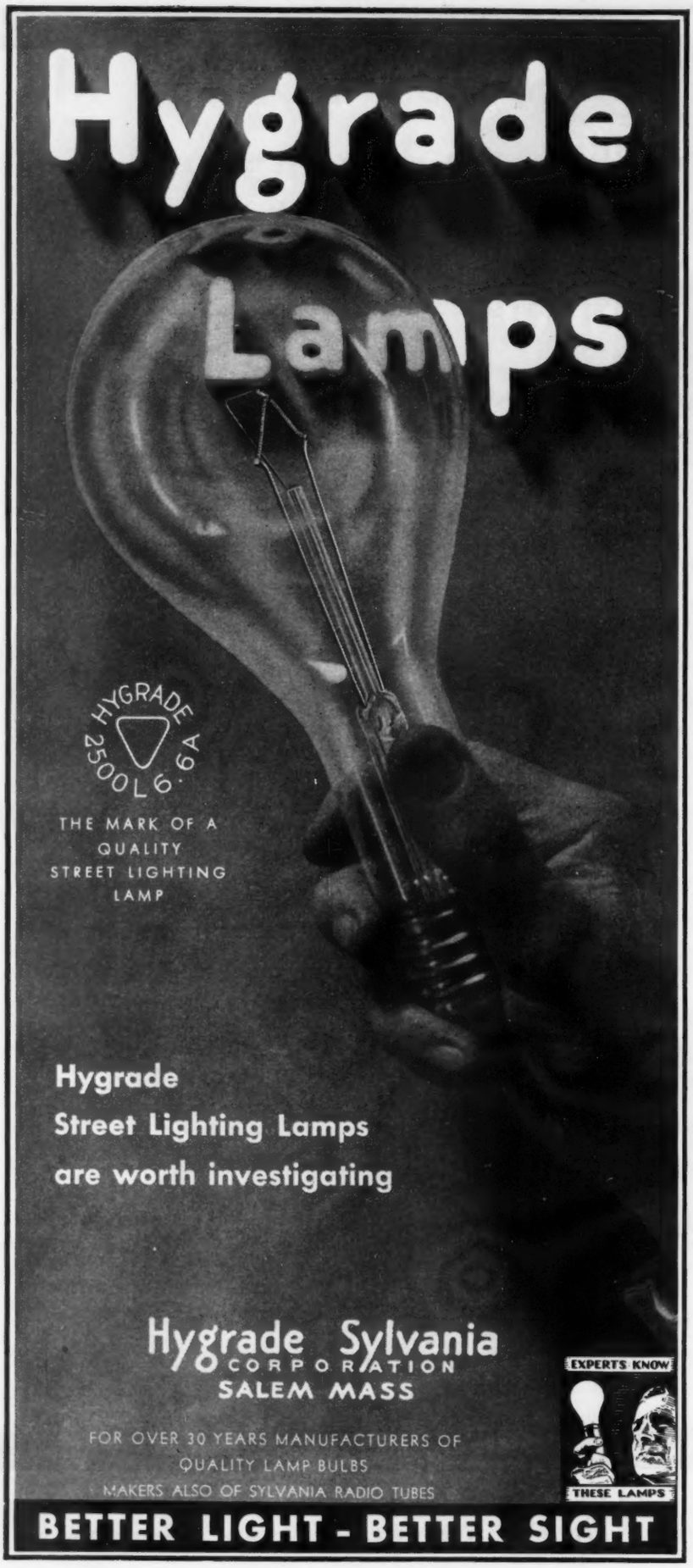


BOOK REVIEWS

Electrons (+ and —), Protons, Photons, Neutrons, Cosmic Rays

By Robert Andrews Millikan. Published by the University of Chicago Press, 5750 Ellis Avenue, Chicago, Ill. 482 pages, illustrated. Price, $3.50.

In narrative form and with an irreducible minimum of mathematics Dr. Millikan has set up what is accepted with regard to the electrical entities out of which matter and energy are built and transformed; just what prompted the successive investigations, what they left unsolved, and what damage they did to preconceived notions is there—romance but no glossing glamour. For the person who cannot follow the involvements of the mathematical-physicist here is the author's "Electron" of 1924 brought up to date with authenticity, lucidity and fluidity of language.

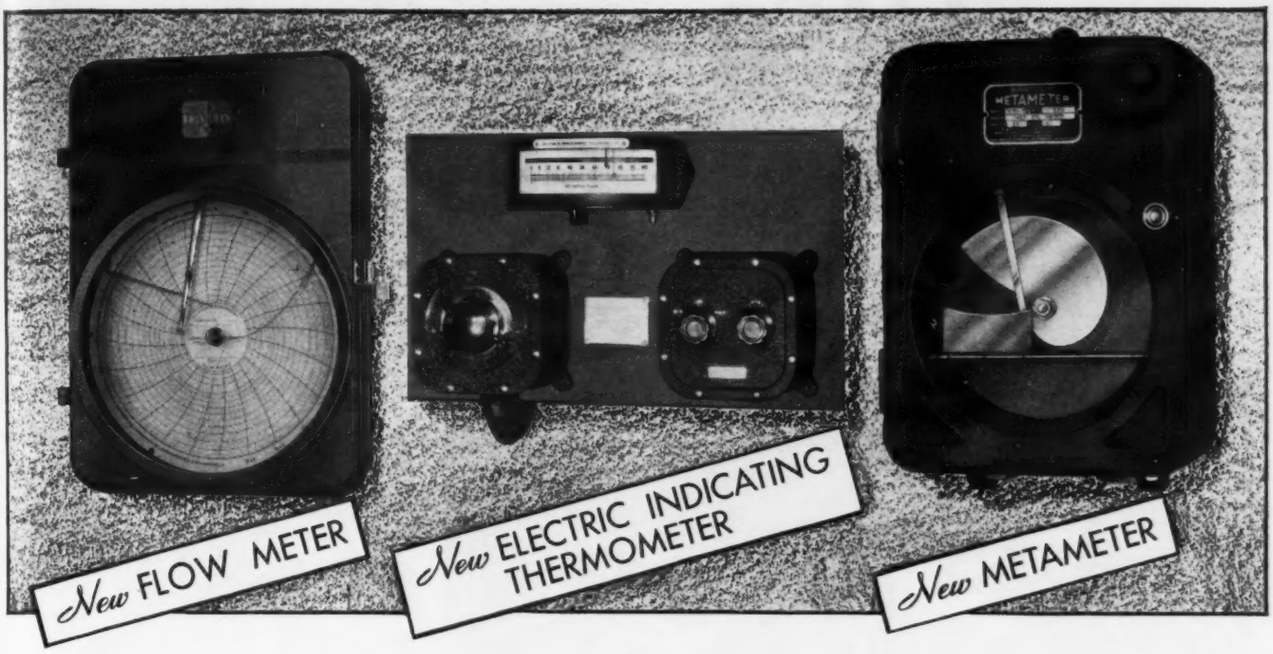
One learns how the proton, positron, neutron, photon were detected and established and then how they were nudged over by newcomers into the atomic family. The illustrations are as thrilling as only photographs can be of the antics of specks that man will never see. The parts that the various stratosphere flights have played in unfolding the drama of the cosmic rays are depicted here along with the stories brought back by electroscopes that went unattended on sea voyages around the world. In short, an engineer who has been content to let cosmic rays and all the "trons" be mere speaking acquaintances can, through this strikingly modest portrayal, enter the family circle and know the very best about every one of them. They do not speak an unintelligible language when they converse.

•

America's Capacity to Consume

By Maurice Leven, Harold G. Moulton and Clark Warburton. Published by the Brookings Institute, Washington, D. C. 265 pages, illustrated. Price, $3.

Any industry which, like the utilities, is trying to induce more consumption of its product or services can hardly escape contemplation of the general capacity of America to consume. There is no doubt that the country can produce however much it wants to consume. The preceding volume, "America's Capacity to Produce," showed that nicely. But how about the adequacy of incomes to support more consumption? How about the savings psychology of the present as compared with the 1920-30 decade? Will folks in the days ahead allocate some of what is called "other living" outlays to the home and its maintenance and its perquisites? If not, it appears that hopes for the 3,000 to 5,000-kw.-hr. home might have to rest somewhat on the prospect of a general elevation of the in-



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TO MEET THE INDUSTRY'S NEW NEEDS

Indications are everywhere that the electrical industry is at the threshold of an epoch-making expansion. There will be need for new and better instruments,—a need which Bristol's new Flow Meter, Metameter and Electric Indicating Thermometer are destined to meet in a growing number of applications.

BRISTOL'S NEW FLOW METER

for recording, controlling, integrating and indicating flow of steam, gases and liquids

Employing the widely accepted orifice and mercury manometer system of flow measurement, this new Bristol's meets the demand for a rugged, accurate and reasonably-priced mechanical flow meter. Even under severe field conditions it can be counted on to give precision measurement.

Important features are unique means for checking integrator, leak-tight stuffing box bearing, forged steel mercury chambers, welded joints, and accuracy unaffected by changes in mercury volume. Write for Bulletin 425.

BRISTOL'S NEW METAMETER

for telemetering pressure, liquid level, temperature and motion

When steam pressures, voltage or levels rise or fall at any place a few feet or a thousand or more miles from headquarters, Bristol's new Metameter records it instantly. A 12-inch chart keeps a continuous record of every fluctuation at the distant point. Any change from

normal, whether alarmingly abrupt and large or minute and gradual, is immediately and permanently recorded.

The durations and not the intensities of the transmitted impulses are proportional to the values measured. Only a simple two wire circuit is needed. Where available, any existing telephone line may be employed without danger of interference with or from the conversation carried, line inductance or capacity. Write for Bulletin 424.

BRISTOL'S NEW ELECTRIC INDICATING THERMOMETER

for taking temperatures at as many distant places as you like

Accessibly installed at a central headquarters, Bristol's new Electric Indicating Thermometer indicates the temperatures at any number of distant points. It does so with a precision conforming to the highest standards of accuracy. The measuring elements or resistance bulbs are interchangeable. If one is accidentally destroyed, it can quickly and inexpensively be replaced by another. Standardization at proper intervals keeps accuracy permanently constant. Write for Bulletin 997.

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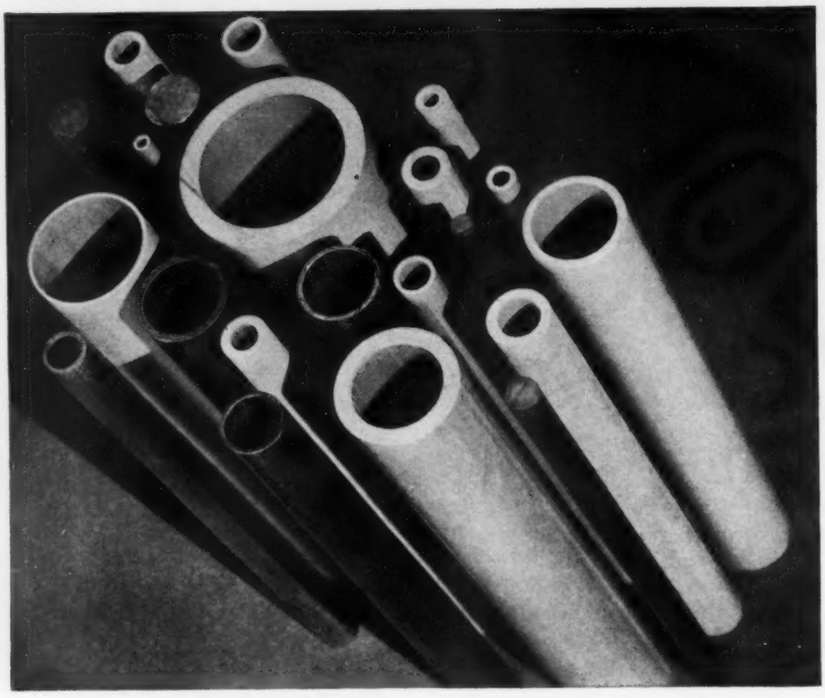
Laminated Bakelite Tubes

FOR CABLE JOINTS, TRANSFORMER LEAD-INS, HIGH VOLTAGE CONNECTIONS, ETC...



THESE TUBES have high mechanical and dielectric strength . . . very low percentage of moisture absorption.

Easily cut, machined and threaded.

Available in both paper and fabric bases . . . in practically any length, diameter, and wall thickness.

For Chemicals and Alkalis: We make special tubing with paper or fabric base with high resistance to chemicals and alkalis.

Write for further information, prices, and samples.

Rods, Sheets and Fabricated Parts of "Lamicoid" Laminated Bakelite are also available

NEW PRICE LIST: Write for New Price List No. 98 describing our complete line of Micanite, Varnished Cambric, Laminated Bakelite, and other insulating materials.

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200 Varick Street, New York, N. Y.; 542 South Dearborn Street, Chicago, Ill.; 1330 Schofield Building, Cleveland, Ohio. *Branches at* Birmingham, Boston, Cincinnati, Los Angeles, San Francisco, Seattle. *Canada:* Montreal, Que.; Toronto, Ont.

come level, at least of those in the lowest brackets.

Utility executives and electrical manufacturers will find here an analysis of a huge mass of income and consumption statistics. The authors very confidently conjecture that if the 5,800,000 families having incomes in 1929 of less than $1,000 were to have those incomes increased from an average of $650 to about $1,150, then their consumptive expenditures would assume a pattern similar to that prevailing among the 5,000,000-odd families who were already in that class. That would mean an increase of 25 per cent in the nation's consumptive expenditures. It is self-evident that some of the worry about the minimum electric customer who never quite pays his way would be reduced. Certainly the situation would be hopeful for those industries whose transactions with the average consumer amount to $30 to $100 if $2,000 could be made the family minimum. Those families now below that level (there are 19,000,000 of them) would spend, not $7,000,000,000, but $14,000,000,000 for housing and home maintenance and services. It would take only 3 per cent of that increase, allocated to greater electrical comforts, to mean $500,000,000 to electric systems. That would be enough to put them in a position to make T.V.A. rates look rather high.

It is largely a matter of moving each of the lower income brackets upward. If the means of doing this curtails the 3 per cent of the national income which now goes to the 2.75 per cent of the families who have $8,000 or more to spend, the authors are not disturbed. The means of redistributing current income so as to promote a better functioning economic system will be scrutinized in the subsequent volume, "The Formation of Capital."

In this volume there is thorough discussion of the national income, the family income and outgo and, finally, the correlation of income with consumption and both of them with production. The final half of the book is devoted to statistical supporting data.

•

Die Elektrischen Maschinen, III

(Electrical Machinery, Vol. III, Design)
By M. Liwschitz. Published by B. G. Teubner, Liepzig. 409 pages, 307 illustrations. Price, bound, 22.50 reichsmark.

Two volumes of the series have previously been published. The first dealt with fundamental theory, the second with materials and methods of construction, special attention being given to insulating materials. These lead up to the third and final volume, which takes up the computations involved in the actual design of the various classes of electrical machinery — transformers, asynchronous, synchronous, direct-current

"Let 'er Go!"
Nitroglycerin was discovered by Sobero in 1846. Out of it, the first Dynamite was made by Alfred Nobel in 1867. Gun Powder was in use in 800 A.D.

Basic to civilization was the discovery of Explosives, which made possible, for instance, the Boulder Dam . . . Equally basic was the discovery in 1906 by A. L. Marsh, of the chromium-nickel alloy, Chromel; for this invention made Electric Heat available to home and factory. Chromel thus created a new industry, a new market, and a new load for the power company. According to the Department of Commerce, the domestic heating load alone represents an annual billing of about $130,000,000 . . . You may safely entrust your heating-load to heating-elements of Chromel . . . Write to Hoskins Mfg. Co., Detroit, for Catalog J. W.

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CHROMEL

THE *wire* THAT MADE ELECTRIC HEAT POSSIBLE

Combine
Business with Pleasure

THE Edison Electric Institute will again hold its annual convention at Atlantic City, from June 3 to June 6.

When you attend the Convention, plan to extend your stay into a real vacation at this World's Playground. Here you will find an infinite variety of amusements combined with a natural environment conducive to rest and recreation.

Atlantic City welcomes the Convention delegates to this resort. The latch string is out—the key to the city is yours

IN ATLANTIC CITY

where a hundred hotels hold the comforts of home

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GALVANIZED PRODUCTS

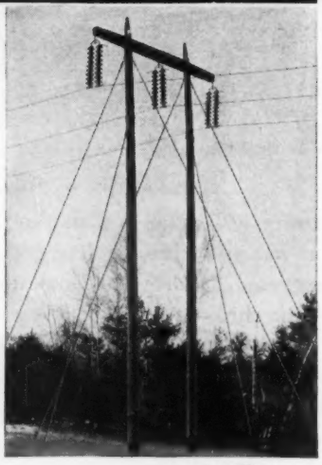
INDIANA STEEL & WIRE CO. Crapo Galvanizing MUNCIE, IND.

Specified by Leading Utilities Everywhere

The longer life and lower maintenance cost of *Crapo* Galvanized Steel Strand and Wire are matters of record with many of America's leading utilities. Time and again, these dependable products with their heavy, *pure* zinc galvanized coatings, have demonstrated their ability to resist corrosion far beyond the normal period of replacement.

That is one of the reasons why utilities from Maine to California now specify *Crapo* Galvanized Products on all new and replacement work.

Indiana Steel & Wire Co.
Muncie, Indiana



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Steel Strand

• • •

Telephone and Telegraph Wire

Typical installation of Cumberland County Power and Light Co., Portland, Maine. *Crapo* Galvanized Seven Wire Steel Strand used for guying.

and divers types of alternating-current commutator machines, and converters. For each of these the analytical discussion is followed by illustrative examples worked out in considerable detail. The new volume, and indeed the whole series, should be of especial interest to designers. The author is chief engineer of the Siemens-Schuckert Werke.

●

The Rise and Fall of the Gold Standard

By Sir Charles Morgan-Webb. Published by the MacMillan Company, 60 Fifth Avenue, New York, N. Y. 184 pages. Price, $1.50.

Doubting whether Great Britain ever was on a real gold standard, even though one was maintained after a fashion from 1816 to 1914, the author is sure that it has died forever and is gleeful about it. One gets here a good picture of the machinations resorted to in trying to hold to gold over the last two centuries with most of the emphasis placed on the last four years of hopeless maneuvering. Britain was plunged into disaster in 1924 when the pound was jacked from 18 shillings to 20 shillings and incomes deflated proportionately, all to preserve a dying convention. World trade shrank into insignificance when the United States started gathering gold and forced Britain to cease a long-time policy which had avoided draining any nation's gold. What Sir Charles calls the sterling-dollar is now working successfully to sustain British revival. It is founded essentially on an index number and presupposes ultimate stabilization of prices at higher levels.

●

Utility Chart, 1934

Compiled and published by Robert A. Burrows, 323 Fourth Avenue, Pittsburgh. Price, $2.

A remarkable amount of information has been compressed into a 34x28-in. chart showing the inter-relations of the principal public utility holding, operating and investment companies as of October 1, 1934, per cent control, capitalization and other financial data. Six-year price ranges and estimated earnings for 1934 are listed for 40 companies. Of particular interest at this time is the tax operating-revenue ratio given for most of the holding company groups, with this comment:

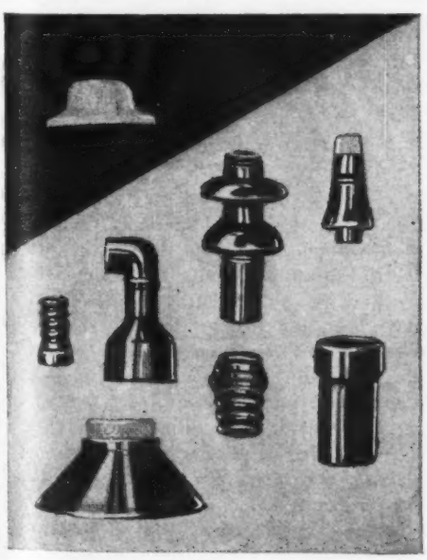
"Careful study should be made of companies with a low tax ratio . . . The consolidated return has enabled the holding companies, in the past, to reduce income taxes by offsetting the profitable subsidiaries with those which have shown losses. As all public utilities must file separate federal income tax returns for 1934 many operating subsidiaries will individually have to pay more in federal income taxes. This increase . . . may materially affect the coverage of bond interest and net income available for stock."

ILLINOIS PORCELAIN
DEPENDABLE INSULATION

- for modernizing Old Equipment and designing New Types

Illinois porcelain helps equipment manufacturers to increase sales and users to save money. Illinois porcelain special parts are included in a wide variety of products today because investigation showed the value of this porcelain and its ability to meet the most unusual needs. Whatever it is you need in porcelain low voltage insulators or special parts we will give you the benefit of our experience.

Samples of any of our stock products gladly sent. See our catalog.



You can always depend on Illinois Porcelain from the largest High Tension Insulator to the smallest Special Bushing. The insulators are made in a complete line for all requirements and are accepted as Standard by Utilities from coast to coast. Illinois Porcelain is produced in a modernly equipped plant where improved manufacturing methods assure a very high quality and low cost service by the finished products.

The component parts of Illinois Multipart and Suspension Type Insulators are joined by our special process. As a result these insulators have never been known to fail through cracking.

For today's economical insulator needs you should specify Illinois Porcelain and get accuracy of dimensions, smoothness of finish and modern design. Large stocks carried, fast deliveries. Send for catalog.

ILLINOIS ELECTRIC PORCELAIN CO.

MACOMB, ILLINOIS

to Standardize on

ILLINOIS

is a Progressive Step

Wagner Transformers
for Every Service
The Wagner line of transformers includes all types and sizes of power transformers and distribution transformers, enabling Wagner to supply all your transformer requirements. The accompanying pictures show a few typical Wagner transformers chosen at random to illustrate the diversity of types of transformers manufactured by Wagner. For information on construction details, applications, and installations, write for Wagner Power Transformer, Bulletin 175 and Wagner Distribution Transformer, Bulletin 172.
T135-2
Wagner Electric Corporation
6400 Plymouth Avenue, Saint Louis, U.S.A.
TRANSFORMERS MOTORS FANS BRAKES

Recent Rate Changes

Public Service Electric & Gas Company, Newark, N. J., has accepted the recent order of the Board of Public Utility Commissioners reducing electric rates $5,177,300 (ELECTRICAL WORLD, May 11, page 84), reserving, however, the right to appeal later. In a letter addressed to the board, Thomas N. McCarter, president, said: "The company emphatically dissents from a minimum rate base of $322,625,405 for the purposes of this proceeding or for any other purpose and confidently asserts that the true value of its electric property for rate-making purposes is many millions of dollars in excess of this sum, even upon the insufficient evidence available in this case. . . . The company also dissents from the propriety of any such rate of return as mentioned by the board in its preliminary statement even in a time of depression. The law of this state is that a public utility is entitled to an 8 per cent return upon the fair value of its property devoted to the public use. Furthermore, this is a period of increasing operating expenses due to the rise in commodity prices and taxation. Then, too, there is in prospect the additional burden that will arise, if the proposed social security legislation is adopted. For all of these reasons it is our opinion that the decrease in revenues provided for by the order of the board is altogether unjust and that the order could not withstand a review by the courts. . . . "

Dividend cut necessary

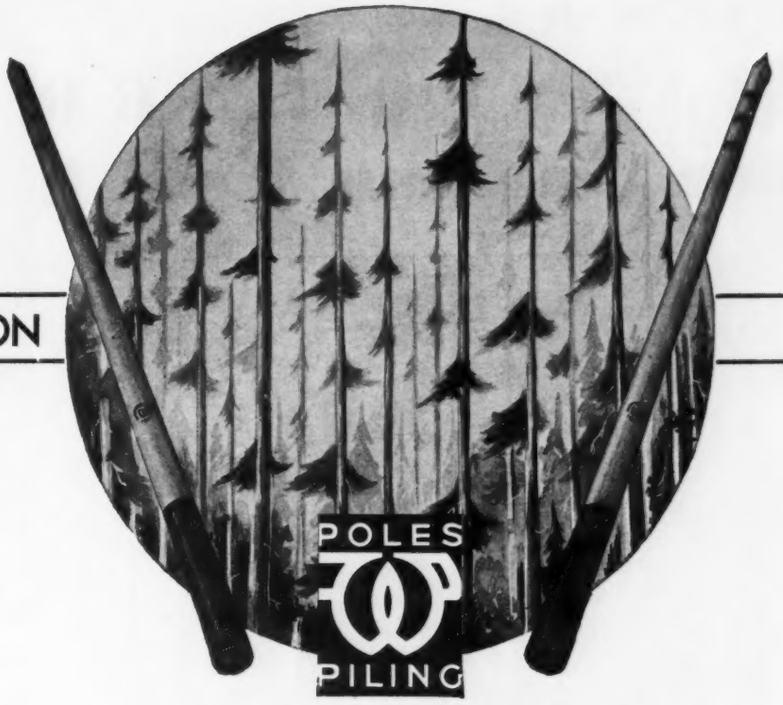
"Every effort will be made through an aggressive sales campaign to increase consumption so as to offset, in part at least, the proposed large decrease in the revenues of the company. The new schedule of rates is promotional in character and should be inducive of the extended use of electricity by the public." The reduction in dividend which Mr. McCarter predicted became a reality this week when directors cut the dividend rate on the common stock from $2.80 to $2.40 yearly by voting 60 cents a share for the quarter to stockholders of record June 1, payable on June 29.

•

New York Public Service Commission's orders in the rate case of the New York Edison Company and other New York City public utility corporations have been annulled by the Appellate Division, Third Department, which remitted the proceeding to the commission for a further hearing. The city of New York is an intervenor in the action. The orders of the Public Service Commission reduced the temporary emergency rates for electricity sold in New York City to 6 per cent on the book value of the company's property. The company was not

ONE ORGANIZATION

FROM
TREE
TO
POLE



Weyerhaeuser OFFERS AN *Improved Pole Service*

The well-known and dependable Cedar Pole and Piling Division of Weyerhaeuser Sales Company now becomes the Weyerhaeuser Pole Company and as a result an even better service to utilities is offered.

The Weyerhaeuser Pole Company will devote its entire energy to the production and distribution of quality Cedar Poles.

The Weyerhaeuser Pole Company has back of it the resources, experience, and vast timber holdings of the Weyerhaeuser organization.

Weyerhaeuser methods of selective cutting insure a constant and everlasting supply of superior timber.

WRITE

How Weyerhaeuser poles are cut, seasoned, and processed is a story interesting and vital to buyers of poles. A booklet describing the methods in detail will be mailed free on your request.

You add economical performance to your lines when you install Weyerhaeuser Poles.

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POLES PILING

WESTERN RED CEDAR POLES

If it's a TRANSFORMER AmerTran can build it

Special 3000 Kva. AmerTran power transformer designed to furnish low voltage for special welding operations.

AmerTran possesses the production facilities, the engineering skill, and the specialized manufacturing experience which permits it to offer public utilities and electrified industries the most widely diversified line of thoroughly modern transformers available.

For more than a third century the American Transformer Company has concentrated exclusively on the production of transformers. The units manufactured have been of all sizes and of every conceivable type—and everywhere they have been considered an excellent product.

Today, more than ever before, AmerTran is well equipped to render excellent service on all types of transformers. We solicit your inquiries on all specifications and, in particular, call your attention to the following products which are regularly manufactured:

Distribution Transformers
Power Transformers
Testing Transformers
Voltage Regulators
Air-Cooled Lighting Transformers
Rectifiers

Your inquiries will receive prompt attention.

AMER TRAN **Transformers**

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170 EMMET STREET NEWARK, N.J., U.S.A.

permitted to put in certain items of expense. It then obtained a certiorari order, which was argued in March. This recent decision of the court upheld the contentions of the company. The commission and the companies are at present engaged in working out rate cuts by negotiation, and the 6 per cent reductions ordered in the fall of 1933 have been relegated to an inconspicuous position.

•

Florida Power & Light Company has announced the third rate reduction in twelve months to electric consumers outside the city of Miami, Fla. The cut will affect more than 11,000 residential customers, who will save approximately $118,000 under the new rate. About 40 per cent of the company's business is within the corporate limits of Miami, George C. Estill, president and general manager, indicated. Miamians will be paying out for electric service about $340,000 a year more than they would have to because of the rate litigation, he pointed out (ELECTRICAL WORLD, December 8, page 84).

•

Public Service Company of Oklahoma has reached an agreement with the State Corporation Commission by which domestic electric rates are reduced in Tulsa, Bartlesville, Okmulgee and McAlester, effective with June 15 billings. The total reduction is estimated at approximately $140,000 annually, $100,000 of which will go to Tulsa customers, $15,000 to Bartlesville, $14,000 to Okmulgee and $10,000 to McAlester.

•

Orders Increasing

Orders for electrical goods continue to increase. For 78 companies reporting to the Bureau of the Census the total for the first quarter of 1935 was $121,814,226, or more than twice as much as for the same period in 1932 and 33 per cent more than in 1933. There was a gain of 3 per cent over the final quarter of 1934.

The upward trend is shown also by the annual totals—in 1932, $282,662,547; in 1933, $325,066,108; in 1934, $439,067,287. Comparison with the Census of Manufactures for 1933 shows that the 78 companies produced about two-thirds of the total value of electrical machinery, apparatus and supplies.

•

Japanese to Fight Bulb Ban

Representatives of the Tokio Lamp Company announced last week they had been instructed by their head office in Japan to post a $15,000 appeal bond from the Federal injunction preventing importation of the foreign electric bulbs (ELECTRICAL WORLD, May 11, page 50). The bond will stay automatically the permanent injunction against the importation, pending settlement of the action brought by the General Electric Company.

free TO ENGINEERS

3

NEW BATTERY MANUALS

ON ELECTRIC TRUCKS AND TRACTORS, you can now cut storage battery costs on an average of 16.6%. New Battery Manual shows how the exclusive construction of the Gould Armored Kathanode assures extra savings. Its 24 pages include complete data on performance curves, dimensions and weights, construction photos and diagrams.

•

ON ELECTRIC STREET TRUCKS Gould Armored Kathanode Batteries insure higher speed and longer cruising capacity. Valuable Transportation Manual, just published, gives the inside story back of this extra efficiency. Photos, charts, diagrams, prove how this modern battery has greater capacity to meet the modern traffic demands on street trucks.

•

ON MINE AND INDUSTRIAL LOCOMOTIVES we offer a Battery with proven operating characteristics and long life . . . a product which can definitely reduce your underground transportation cost. This heavy-duty application of Gould Armored Kathanode Batteries is fully described in Bulletin 949. The 36-page publication presents comprehensive technical details in practical form, easily understood.

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OF DEPEW, NEW YORK

FREE MANUAL COUPON

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530 to 600 Neoga St., Depew, N. Y.

Please send me the following Manuals:

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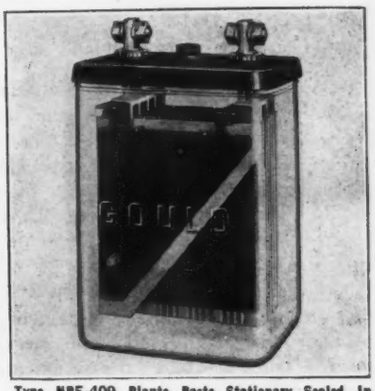
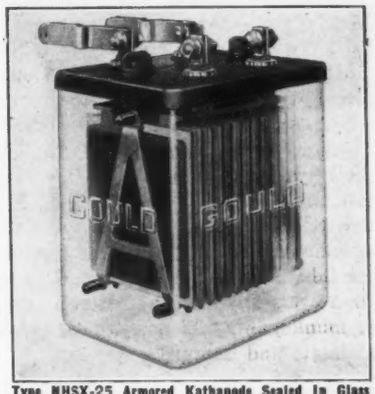
..... No. 947 on Electric Street Trucks.
..... No. 949 on Mine and Industrial Locomotives.

Name .....

Address .....

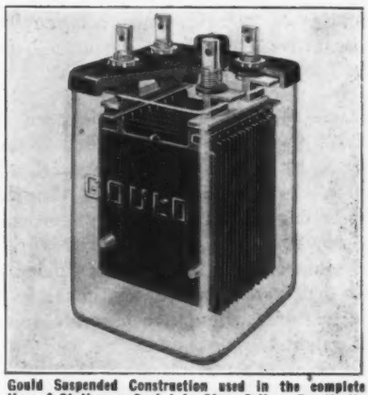


Type NPE-409 Plante Paste Stationary Sealed in Glass Cell. Sectioned to show separators and positive plate. Standard capacities from 16 to 800 ampere hours.



Type NHSX-25 Armored Kathanode Sealed in Glass Cell for Stationary application. Construction representative of medium and largest capacity cells. Standard units in capacities from 5 to 1000 ampere hours.

Type NHSC-9 Dreadnaught Paste Plate Cell of Sealed in Glass Construction for Stationary application. Design is typical of entire line of Dreadnaught Cells. Capacity range from 5 to 1000 ampere hours in standard units.



Gould Suspended Construction used in the complete line of Stationary Sealed in Glass Cells. Practically entire element weight supported from jar walls. An exclusive Gould design which makes possible the use of hard rubber covers, without distortion or breakage.

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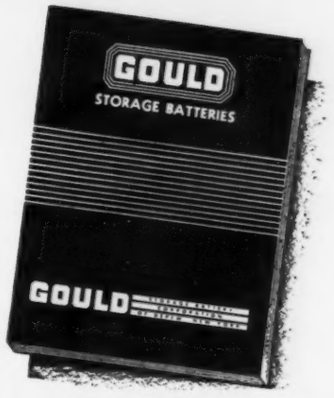

Newest Battery Manual On Stationary Service

THIS new book is a most comprehensive and valuable manual on batteries for all types of stationary applications. Its 50 illustrated pages include the following useful information: Capacity charts, installation weights and dimensions, recommended cell assemblies, discharge charts, guarantee forms, list prices, and fundamental data on all types . . . a technical publication, not just a catalog.

Complete construction details show why the patented features of the Gould Armored Kathanode . . . an exlcusive Gould Battery . . . reduce costs without sacrifice of life or performance. Gould Plante Paste and Dreadnaught Batteries are also described in full. Your electrical library is not complete without this modern treatise. Mail coupon today for your complimentary copy.

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OF DEPEW, NEW YORK

Gould Storage Battery Corporation,
Main Plant and Headquarters,
530 to 600 Neoga Street, Depew, N. Y.

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SILENT GEARS

New Utility Bills Passed by Legislatures

Gov. Paul V. McNutt of Indiana has signed a bill passed by the state Legislature which provides for the formation of non-profit membership corporations to promote and encourage fullest possible use of electric energy in the state by making the energy available to the rural districts. The new law gives the Public Service Commission power to pass on and approve articles of incorporation, fees, rents, tools and service charges and to have jurisdiction over rates to be charged.

•

State-owned power is made possible to New Mexico through appointment by Gov. Clyde Tingley of a three-man board under authority of a bill passed unanimously by both branches of the recently adjourned Legislature. Known officially as the Rural Electrification Authority, the new board is empowered to acquire electrical systems by purchase, lease, devise, gift, or the exercise of the right of eminent domain; to render service to the inhabitants of the state, and by contract with any person, federal agency, or municipality to acquire, own, operate, maintain and improve a system.

•

Bill creating the Grand River Dam Authority has been passed by the Oklahoma Legislature, which adjourned *sine die* April 30, and has been approved by the Governor. This measure creates a conservation and reclamation district comprising sixteen counties of northeastern Oklahoma. The authority will have power to generate and sell water power and electric energy.

•

Both houses of the Nebraska Legislature have passed a bill providing that any city or village may construct, purchase or otherwise acquire electric light and power plants, distribution systems or transmission lines, pledging future gross earnings. The power companies asked an amendment that would require purchase or condemnation before launching the municipal enterprise, but lost by a small vote margin, after company representatives had been denounced from the floor as lobbyists.

•

The Massachusetts Legislature has killed the bill which proposed a probe of the rates, charges and financial structures of electric utilities in the state. Following an agreement by the power companies to reduce rates as a result of conferences with Governor Curley and his special committee, sentiment in the Legislature swung considerably toward the right.

•

An overwhelming victory for the advocates of public ownership was won in the California Senate when a measure

BRINGING ELECTRICITY to Northern Illinois Farms

THE availability of electric service is recognized as an essential ingredient to the rehabilitation of American farm life.

Recognizing this influence, the Public Service Company of Northern Illinois has for years maintained a liberal policy for the extension of electric lines into rural territory. Today finds the company supplying electricity to more than ten thousand farm customers, and rapidly developing plans for reaching many more within the area served.

•

PUBLIC SERVICE COMPANY of NORTHERN ILLINOIS

•

General Offices
72 West Adams Street, Chicago

passed which would constitute each irrigation district as a power district, with the authority to issue revenue bonds for the development of electric energy and to construct transmission lines and erect stand-by plants.

•

Efforts on the part of Governor Horner of Illinois and Mayor Kelly of Chicago to impose a 3 per cent of gross receipts tax upon public utilities furnishing electricity, gas or water to persons for use or consumption failed when the House of Representatives defeated the measure.

•

A rural electrification bill was recently signed by Governor Johnston of South Carolina following its passage by the Legislature. The new legislation sets up a state authority to foster suburban electric power facilities and consumption and is authorized to issue bonds to finance its program. A state electrification authority act was also signed by Governor Cooney of Montana.

•

Under the terms of a bill passed by the North Dakota Legislature if the Board of Railroad Commissioners and a public utility company fail to reach an agreement for a reduction of at least 15 per cent within 30 days the board is required summarily to order a reduction of 25 per cent, which shall continue until a hearing shall have been held and rates thereafter determined. A company whose rates have been summarily reduced may, however, continue to collect the pre-existing rates provided it keep 25 per cent of the collections in a separate fund for distribution to customers after establishment of rates by the board, or in lieu of that, if it give a surety bond.

Before adjourning the North Dakota Legislature passed a new retail sales tax law which imposes a 2 per cent tax on gross receipts from the sales, furnishing or service of electricity, gas, water and communication service when sold at retail.

•

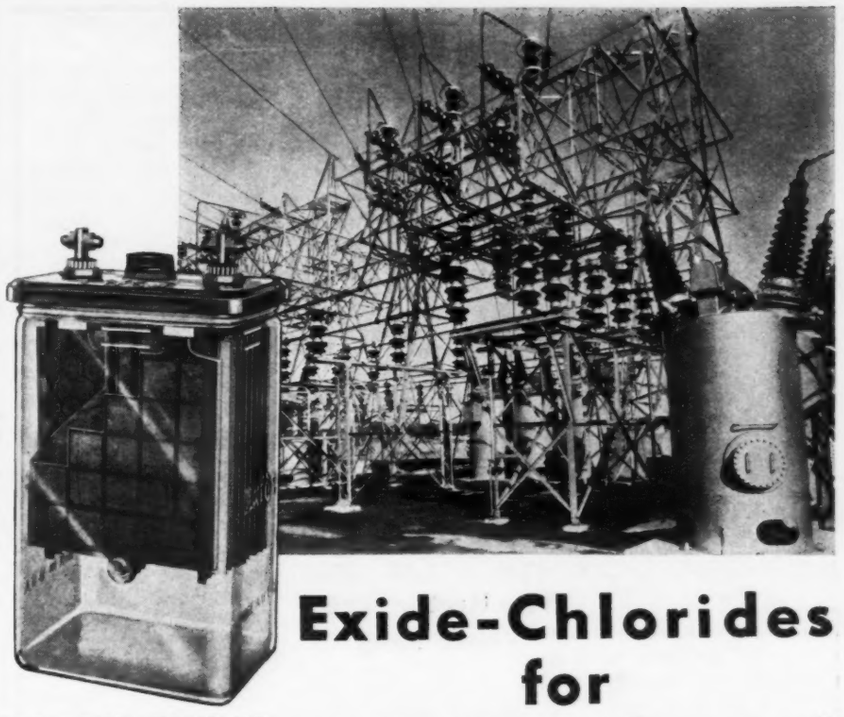
The Iowa Legislature has turned down a proposal for rural electrification throughout Iowa with the aid of the government in spite of the avowed approval of Governor Herring.

•

In South Dakota recent legislation authorized the creation, with the consent of the Board of Railroad Commissioners, of municipal power districts for the construction, acquisition and operation of power plants.

•

In West Virginia recent legislation makes it unlawful for a public utility company to acquire control of any other such company or to dispose of its property without consent of the Public Service Commission.



Modern Exide-Chloride Cell with sealed glass jar used in control bus battery service.

Exide-Chlorides for Unfailing Control Bus Protection

THE dependability of Exide-Chloride Batteries for *control bus protection* is proved by their widespread use in many of the world's largest power plants.

Wherever there are oil circuit breakers to be opened and closed, wherever remote control of power plant apparatus is dependent upon unfailing battery power—there you can specify Exide-Chlorides with the same confidence that other leading engineers place in them.

The ability of the Exide-Chloride to stand up under unfavorable operating conditions, to recuperate quickly after frequent high discharges and to render years of life at minimum expense, make it the outstanding battery for a variety of power plant services. Write us. Our Exide Service Engineers are at your command to help you solve your power plant battery problems.

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THE ELECTRIC STORAGE BATTERY CO.
The World's Largest Manufacturers of Storage Batteries for Every Purpose.
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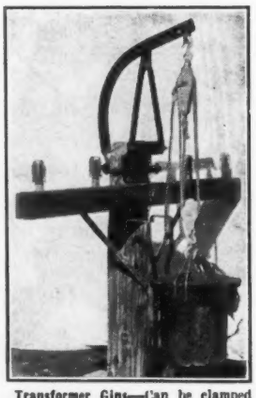
BIG SAVINGS

IN OPERATING AND MAINTENANCE COSTS!

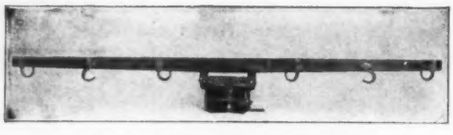
Coffing Hoists, *the Universal Tools*

Utilities, everywhere, have found Coffing Hoists especially adapted to line construction and maintenance — replacing the block and tackle — because of their compactness and the fact that one man can pull as much with one hoist as several men can with a large block. Weather does not affect their operation. Capacity ¾ ton to 6 ton.



Transformer Gins—Can be clamped securely to top of poles. For lifting transformers.

Temporary Crossarm and Clamp—Can be readily clamped to a pole above or between the crossarms. For changing arms on corners or on pole lines. Has a tilting hook with automatic lock, large enough to hold a 1¾ in. line hose. Prevents current from arcing from one hook to another in wet weather.



Write *today* for catalog containing complete information.

COFFING HOIST COMPANY

313-319 E. Van Buren St. Danville, Illinois

Special Transformer Code Protested at Hearing

Protest was voiced at hearing held recently in Washington by the Automotive Parts and Equipment Code Authority against the proposed inclusion of ignition coils under a code of fair competition for the specialty transformer industry. Concurrently, the Radio Manufacturers Association protested against the definition in the proposed pact which would bring the manufacturers of radio transformers under its jurisdiction. In letters directed to NRA and read into the record, both groups challenged the representative character of the sponsoring organization — the National Electrical Manufacturers Association. The hearing was conducted by Assistant Deputy Administrator J. R. Howland and was called for the purpose of considering the proposed code, which would be supplemental to the code for the electrical manufacturing industry.

Appearing on behalf of the N. E. M. A., P. M. Staehle stated that of the 62 manufacturers of specialty transformers 23 are members of the sponsoring group and represent 70 per cent of the 1933 volume. A. L. Kress, also testifying for the Association, maintained that 11 manufacturers of radio transformers, producing 67 per cent of the 1934 volume, are members of the National Electrical Manufacturers Association.

•

Electrical Manufacturers Get Bethlehem Orders

Included in an order amounting to more than $1,250,000 for new electric equipment to be furnished and completely installed by the General Electric Company at the Lackawanna plant of the Bethlehem Steel Company are seven d.c. motors totaling 22,500 hp. for driving the finishing end of Bethlehem's new continuous hot strip mill, one of the world's largest. This finishing end drive will consist of two 4,500-hp. and three 3,500-hp. motors and one each of 2,500-hp. and 500-hp. ratings.

In addition, the order includes two three-unit, 6,000-kw. motor-generator sets to supply power for the above motors, one three-unit, 6,000-kw. motor-generator set to supply power to the drives of two tandem cold strip mills, the most modern ventilating system yet used in a steel mill motor room and complete switchgear and control equipment for the preceding apparatus, including nineteen metal-clad oil circuit breakers, each with an interrupting capacity of 500,000 kv.-amp.

Contracts amounting to $1,250,000 were also awarded by Bethlehem to the Westinghouse Electric & Manufacturing Company for this project. The electrical units include four 3,000-hp. and one

Cable Systems

Like Chains have their Weak Links

For continuity of service, the insulation used in cable splices in underground cable systems must be equal to the insulation of the cable itself.

Realizing the vital importance of the insulating cloth used in Varnished Cambric Cables and the treated tapes used in the splices, Westinghouse has spared neither time nor money in research and manufacturing to obtain the ultimate goal.

Insist on Westinghouse duocable tape for the cable and "Oil-packed" tape for the splices, to obtain low power loss, high dielectric strength, and long life.

Address Westinghouse Electric & Manufacturing Company—Department 101, East Pittsburgh, Pennsylvania.

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1,000-hp. a.c. motors, nine 1,250-hp. d.c. motors and one 2,500-kw. and one 1,300-kw. motor-generator sets. Westinghouse is also supplying nearly 800 motors and variable-frequency units for the roll tables of the mills and motors, motor-generator sets and control for a flying shear which catches and cuts to accurate lengths strip steel as it passes through the final rolling process. Westinghouse equipment will be installed to provide a cool air circulating system to ventilate the larger motors and motor-generator sets.

•

Better Light-Better Sight Adds $6,375,000 Revenue

Fifty-seven electric utility companies, representing approximately 32 per cent of the total consumers of electric energy in the country, have reported on the number of kilowatts of lighting load added and the estimated annual increase in revenue resulting from this added load, as the result of Better Light-Better Sight activities. This group of 57 companies report a total of 159,307 kw. lighting load added, of which 74,158 was commercial, 42,461 domestic, 41,595 industrial and 1,093 street lighting. The estimated annual increase in revenue totaled $6,375,006—commercial, $4,348,062; domestic, $1,015,400; industrial, $775,742, and street lighting, $236,702. These figures vary considerably, due to length of time they have been operating. Some reports cover the entire year of 1934, others just the fall and first part of 1935, and in some cases, only two or three months. On a yearly basis, the kilowatt lighting load and estimated increase in revenue would have been substantially larger.

•

Hotpoint Range Orders Increase 44 Per Cent

The largest single week's shipments of electric ranges and water heaters since 1929 were made the second week in May by the Edison General Electric Appliance Company of Chicago, according to an announcement by Pierre L. Miles, sales manager. Orders received for Hotpoint ranges are 44.2 per cent ahead for the first four months of 1935 as compared with the same period last year. Water heater orders are 186.8 per cent ahead, Mr. Miles reports. Five hundred employees have been added to the factory payroll to take care of this increased demand.

"We confidently believe that the electric range is in a comparable position today to the electric refrigerator at the beginning of its wide public acceptance ten years ago," Mr. Miles says. "If this is true, then the sales increases being recorded today are only a prelude to a 'boom' in the electric range business beyond our most optimistic predictions."

HOW MANY

OF THESE QUESTIONS CAN YOU ANSWER?

1. What new device saves 25% to 40% of drafting time and results in far greater accuracy?
2. How can you eliminate discoloration, brittleness and bad odor from Vellum tracings?
3. Is it possible to make a pencil tracing that will reproduce approximately as well as an ink tracing—thereby eliminating the expense of ink work?
4. By what simple, inexpensive process are black line prints made directly from the tracing—without the use of a negative, and *faster* than blue prints?
5. What process is used by engineers and draftsmen when they wish to make extensive alterations on part of a tracing, *without* redrawing the entire tracing?

You'll find the answers—and a mine of other valuable information, besides—in our new, Free Book, "Ten Doors To Progress." Mail the coupon for your copy . . . There's no obligation.

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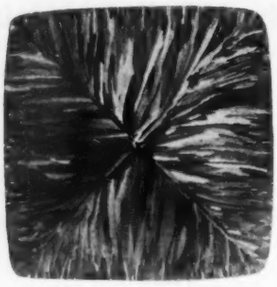
A Superior Copper
For the
Electrical Industry



OFHC Copper, being oxygen-free, is much more plastic and ductile than electrolytic, tough-pitch copper. It can be formed and worked without defects appearing either internally or on the surface. It is a better welding or brazing copper because there are no oxides to react with the reducing flame of the torch. It withstands vibration better. And each shipment of OFHC Copper is uniform in every way. The fabricator can count on this.

Electrically, OFHC Copper exceeds the A.S.T.M. standards.

The use of OFHC Copper is growing steadily. Where the construction must be of the best, leading manufacturers are using it for such parts and equipment as armature coils, bus bars, flexible coils, flexible shunts, pig-tails, rail bonds, rivets, transformer coils, trolley and other wires, and tubing.

UNITED STATES METALS REFINING CO.
420 Lexington Avenue, New York, N.Y.

SALES OPPORTUNITIES IN NEW CONSTRUCTION

IOWA CITY, IOWA—Has engaged Burns & McDonnell Engineering Company, 107 West Linwood Boulevard, Kansas City, Mo., consulting engineer, to prepare plans for city-owned electric light and power plant, and distribution system. Fund of $917,000 is being arranged for project. Proposed to begin work soon.

PHILADELPHIA, PA.—Bureau of Yards and Docks, Navy Department, Washington, D. C., receives bids until May 29 for extensions and improvements in existing electrical system at Naval Aircraft Factory, Navy Yard, Philadelphia, including additional electrical equipment, switchboards, power wiring, etc. (Specification 7913.)

PONTIAC, MICH.—Fisher Body Corporation, Detroit, Mich., and Pontiac Motor Division, General Motors Corporation, same place, affiliated organizations, plan installation of motors and controls, conveyors, electric hoists, regulators and other equipment in new plant additions at Pontiac. Combined project will cost close to $3,000,000.

MEMPHIS, TENN.—Plough, Inc., will take bids at once for new multi-unit chemical and cosmetic plant, including complete electrical equipment, lighting and power wiring, motors and controls, etc. Entire project will cost close to $1,000,000. Arthur L. Nelson Engineers, Inc., 31 St. James Avenue, Boston, Mass., is engineer.

ATHENS, OHIO—Southern Ohio Electric Company, Athens, is considering new addition to electric generating plant in vicinity of Nelsonville, Ohio, with installation of turbo-generator unit and auxiliary equipment for increased capacity. Cost reported over $200,000.

BROOKLYN, N. Y.—Signal Supply Officer, U. S. Army Signal Corps, Army Base, Brooklyn, asks bids until June 3 for 8,000 electricians' knives (Circular 134); at same time, for 980 guys (Circular 131); until June 10 for 5,200 insulators and 118,000 beads (Circular 133).

HIBBING, MINN.—Plans extensions and improvements in city-owned electric light and power plant, including installation of new turbine unit. Fund of $90,000 is being arranged through Federal aid. Burlingame & Hitchcock, Sexton Building, Minneapolis, Minn., are consulting engineers.

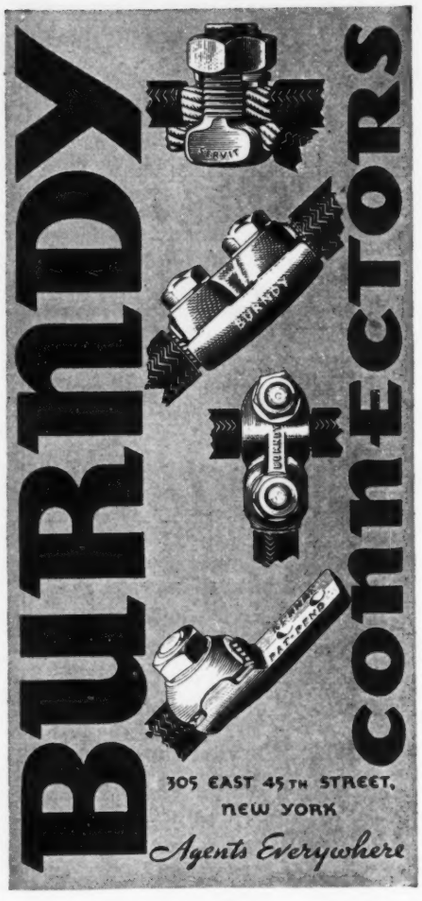
PLAINVIEW, TEX.—Has secured loan and grant of $423,436 from PWA for new city-owned electric light and power plant. Proposed to begin work on project soon.

BARRACKVILLE, W. Va. — Bethlehem Mines Corporation plans installation of heavy duty motors and controls, electric hoists, conveyors and other equipment for rebuilding of coal-mining plant at Barrackville, near Fairmont, recently destroyed by fire. Loss over $200,000.

PITTSBURG LANDING, TENN. — National Park Service, Department of Interior, Washington, D. C., asks bids until June 1 for construction of new overhead electric transmission lines at Shiloh National Military Park, Pittsburg Landing.

LANSING, MICH. — Lakeland Refinery, Inc., 1207 City National Bank Building, Lansing, recently organized, plans installation of motors and controls, pumping machinery, transformer equipment, etc., in new local oil refining plant. Cost about $100,000.

TWIN FALLS, IDAHO — Idaho Power Company, Boise, Idaho, is considering construction of new hydroelectric generating plant on Snake River, Snake River Canyon,



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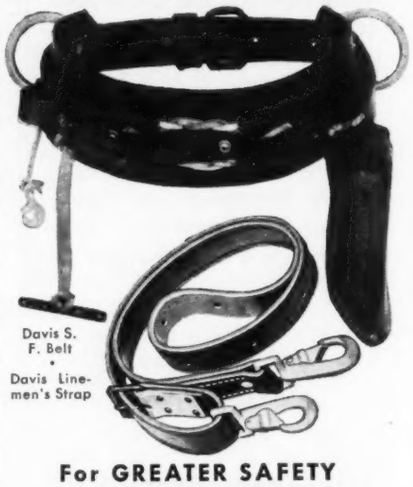

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near Twin Falls, where power dam will be constructed. Station will be equipped for initial capacity of about 8,400 kw. Transmission line will be built to connection with present system in this district. Cost close to $1,000,000.

KNOXVILLE, TENN.—Director of Purchases, Tennessee Valley Authority, Knoxville, asks bids until May 31 for air compressors and accessories for permanent installation in Norris Dam and Wheeler Dam power plants.

ROCHESTER, N. Y.—Rochester Gas & Electric Corporation has taken out permit for extensions and improvements in main generating plant, recently referred to in these columns, and will proceed with program at once. Contracts are being let for equipment. Cost close to $1,000,000.

SPRING VALLEY, MINN.—Has engaged G. M. Orr & Company, Baker Building, Minneapolis, Minn., consulting engineers, to prepare plans for new city-owned electric light and power plant and electrical distributing system. Financing will soon be arranged and bids asked for equipment for the project.

MERRILLAN, WIS. — Has preliminary plans and is arranging financing through Federal aid for new city-owned hydroelectric power plant; project will include power dam, power station and transmission line, with substation and distribution facilities. W. S. Woods, 304 Main Street, LaCrosse, Wis., is consulting engineer.

DENVER, COLO.—Bureau of Reclamation, Denver, asks bids until June 5 for 12 72-in. diameter internal differential needle valves for tunnel plug outlet works, Boulder Dam Power Plant, Boulder Canyon Project, Arizona - California - Nevada (Specification 628).

CHICAGO, ILL.—Intag Company, 2528 West Forty-Eighth Place, plans installation of motors and controls, conveyors and other equipment in new two-story printing ink manufacturing plant. Building permit has been issued. Cost about $100,000.

SACRAMENTO, CALIF. — Sacramento Municipal Utility District, Albert Given, director, will prepare plans and estimates of cost for new electrical distribution system at Sacramento and North Sacramento. Appropriation for engineering work has been secured through Federal aid, to be followed by fund for project.

NORTHVILLE, MICH. — Ford Motor Company, Dearborn, Mich., plans installation of motors and controls, electric hoists, conveyors, etc., in new engine valve manufacturing works at Northville. Cost close to $90,000. Giffels & Vallet, Inc., Marquette Building, Detroit, Mich., is architect and engineer.

WASHINGTON, D. C.—Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 4 for four 6-kva. motor-generator sets, four control appliances and spare parts for Portsmouth Navy Yard (Schedule 5117); until June 7, for 59,000 feet interior communication cable, 20,000 feet double conductor cable, twisted pair telephone cable, lighting and power cable, etc., for Brooklyn, N. Y., and Mare Island, Calif. Navy Yards (Schedule 5144).

TRENTON, N. J.—Public Service Electric & Gas Company, Newark, N. J., is considering installation of underground conduit system on South Broad Street, replacing overhead lines. Ornamental electric light poles are also proposed at a number of street intersections on thoroughfare noted.

NORTH GRAFTON, MASS.—Atlas Yeast Corporation plans installation of motors and controls, conveyors and other equipment in connection with proposed rebuilding of portion of plant recently destroyed by fire. Loss about $100,000.

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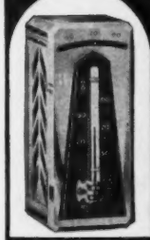

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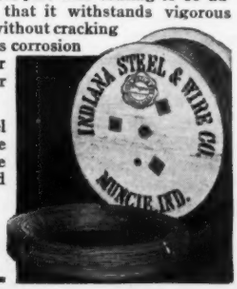

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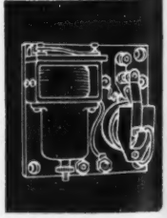

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